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NASA SP-7011 (165)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY

WITH INDEXES

(Supplement 165)

MARCH 1977

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NASA SP-7011 (165)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 165)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in February 1977 in

- *Scientific and Technical Aerospace Reports (STAR)*
- *International Aerospace Abstracts (IAA).*

Scientific and Technical Information Office
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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 198 reports, articles and other documents announced during February 1977 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

Two indexes -- subject and personal author -- are included.

An annual index will be prepared at the end of the calendar year covering all documents listed in the 1977 Supplements.

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IAA ENTRIES (A77-10000 Series)

All publications abstracted in this Section are available from the Technical Information Service, American Institute of Aeronautics and Astronautics, Inc. (AIAA), as follows: Paper copies are available at $5.00 per document up to a maximum of 20 pages. The charge for each additional page is 25 cents. Microfiche[1] are available at the rate of $1.50 per microfiche for documents identified by the # symbol following the accession number. A number of publications, because of their special characteristics, are available only for reference in the AIAA Technical Information Service Library. Minimum airmail postage to foreign countries is $1.00. Please refer to the accession number, e.g., (A77-10052), when requesting publications.

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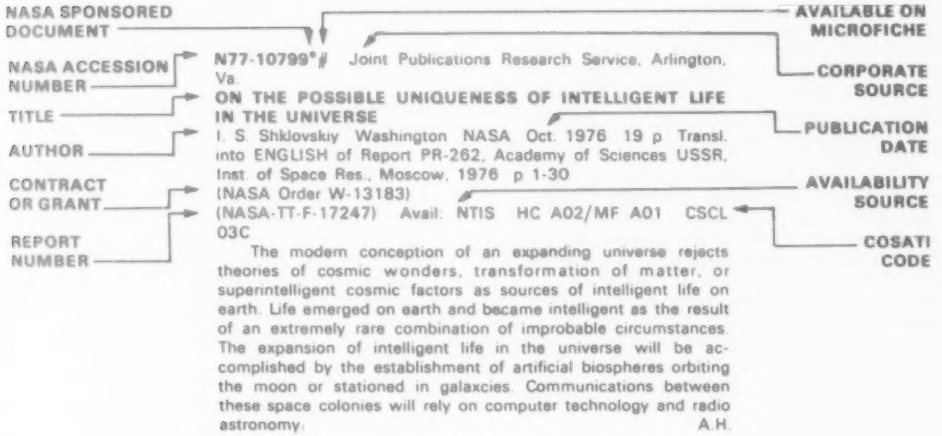
TYPICAL CITATION AND ABSTRACT FROM *STAR*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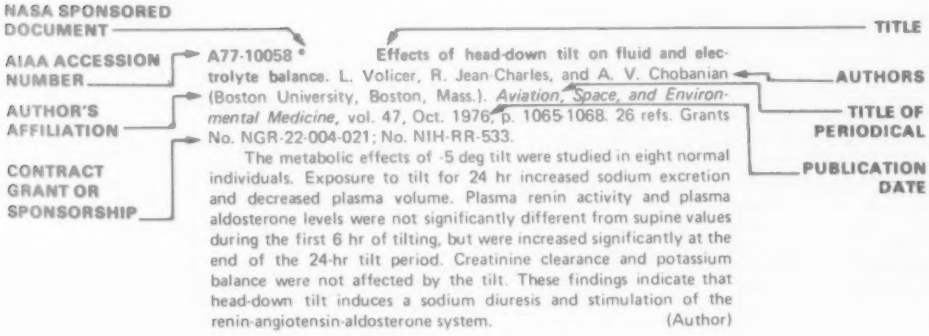
N77-10799*# Joint Publications Research Service, Arlington, Va.
ON THE POSSIBLE UNIQUENESS OF INTELLIGENT LIFE IN THE UNIVERSE
I. S. Shklovskiy Washington NASA Oct. 1976 19 p Transl. into ENGLISH of Report PR-262, Academy of Sciences USSR, Inst. of Space Res., Moscow, 1976 p 1-30
(NASA Order W-13183)
(NASA-TT-F-17247) Avail: NTIS HC A02/MF A01 CSCL 03C
The modern conception of an expanding universe rejects theories of cosmic wonders, transformation of matter, or superintelligent cosmic factors as sources of intelligent life on earth. Life emerged on earth and became intelligent as the result of an extremely rare combination of improbable circumstances. The expansion of intelligent life in the universe will be accomplished by the establishment of artificial biospheres orbiting the moon or stationed in galaxies. Communications between these space colonies will rely on computer technology and radio astronomy. A.H.

TYPICAL CITATION AND ABSTRACT FROM *IAA*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A77-10058 * Effects of head-down tilt on fluid and electrolyte balance. L. Volicer, R. Jean-Charles, and A. V. Chobanian (Boston University, Boston, Mass.). Aviation, Space, and Environmental Medicine, vol. 47, Oct. 1976, p. 1065-1068. 26 refs. Grants No. NGR-22-004-021; No. NIH-RR-533.
The metabolic effects of -5 deg tilt were studied in eight normal individuals. Exposure to tilt for 24 hr increased sodium excretion and decreased plasma volume. Plasma renin activity and plasma aldosterone levels were not significantly different from supine values during the first 6 hr of tilting, but were increased significantly at the end of the 24-hr tilt period. Creatinine clearance and potassium balance were not affected by the tilt. These findings indicate that head-down tilt induces a sodium diuresis and stimulation of the renin-angiotensin-aldosterone system. (Author)

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AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 165)

MARCH 1977

IAA ENTRIES

A77-12980 # **Requirements concerning biotelemetry systems with examples regarding the application (Anforderungen an Biotelemetrien mit Anwendungsbeispielen).** Mr. Hahn (Messerschmitt-Bolkow-Blohm GmbH, Ottobrunn, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium uber Telemetrie-Messdatenerfassung, Echtzeitdatenreduzierung und -speicherung, Munich, West Germany, June 23, 24, 1976, Paper 76-123.* 7 p. In German.

Biotelemetry, as it is understood today by the applier, involves the transmission of data in the HF range. The requirements concerning a suitable biotelemetry system are related to low weight, long times of operation, the needed range, the number of channels which are required, aspects of precision and frequency range, environmental requirements, and transducer characteristics. Attention is also given to the advances made in the development of biotelemetry since its introduction in 1949 and to problems which have yet to be solved to make a wider application of telemetry methods possible. G.R.

A77-12984 # **Telemetry for biophysical experimental data from swimming probands (Telemetrie für biophysikalische Messwerte von schwimmenden Probanden).** M. Steinich (Raumfahrtelektronik GmbH und Co., Göggenhofen, West Germany). *Deutsche Gesellschaft für Luft- und Raumfahrt, Symposium über Telemetrie-Messdatenerfassung, Echtzeitdatenreduzierung und -speicherung, Munich, West Germany, June 23, 24, 1976, Paper.* 16 p. In German.

For a number of applications it is desirable to obtain biophysical experimental data from probands who are swimming in the water or who are diving. Such applications can be related to tests conducted with new diving equipment or with protective clothing for navy fliers who after a crash are floating in the water. Applications involving the transmission of data in underwater archeological studies are also conceivable. A description is given of various approaches for solving the problems connected with the considered applications. Attention is given to the mechanical design of the telemetry encoders, aspects of power supply, and the possibilities which exist for the transmission of the PCM signals. G.R.

A77-13007 * # **Potential biomedical applications of ion beam technology.** B. A. Banks, A. J. Weigand (NASA, Lewis Research Center, Cleveland, Ohio), C. L. Van Kampen (Case-Western-Reserve University, Cleveland, Ohio), and C. A. Babbush. *American Institute of Aeronautics and Astronautics, International Electric Propulsion Conference, Key Biscayne, Fla., Nov. 14-17, 1976, Paper 76-1018.* 12 p. 15 refs. Grant No. PHS-5-T-01-GM-01090-14.

Electron bombardment ion thrusters used as ion sources have demonstrated a unique capability to vary the surface morphology of surgical implant materials. The microscopically rough surface texture produced by ion beam sputtering of these materials may result in improvements in the biological response and/or performance of implanted devices. Control of surface roughness may result in improved attachment of the implant to soft tissue, hard tissue, bone cement, or components deposited from blood. Potential biomedical applications of ion beam texturing discussed include: vascular prostheses, artificial heart pump diaphragms, pacemaker fixation, percutaneous connectors, orthopedic prosthesis fixation, and dental implants. (Author)

A77-13042 # **Effect of low-level hypoxia on the performance quality of a human operator (Vliianie malykh stepenei gipoksii na kachestvo raboty operatora).** A. V. Miroliubov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 2, Jan.-Feb. 1976, p. 127-130. 7 refs. In Russian.

Experiments were conducted to study the performance quality of a human operator assigned with tracking functions and moving, without preliminary adaptation, into an environment with slightly reduced partial oxygen tension. Performance quality was examined using a model of single-coordinate tracking of a sinusoidal signal during breathing of air and a hypoxic mixture containing 15.8% O2. Analysis of tracking acts revealed four types of tracking. It is found that breathing the given hypoxic mixture degrades the tracking quality of a nonadapted operator due to impairment of the expiration process on the specified trajectory. The influence of small values of hypoxia is characterized by significant individual differences. S.D.

A77-13072 # **Evaluation of the working capacity of a pilot during flight duty (Otsenka rabotosposobnosti letchika v techenie letnoi smeny).** N. I. Frolov. *Voenno-Meditsinskii Zhurnal,* July 1976, p. 65-68. In Russian.

The working capacity of a pilot during the time he is at the controls - in the presence of sufficient level of health, training, and motivation - may be defined as his ability to perform the required tasks with a given efficiency and proper tension of the psychophysiological systems of the body. The paper stresses that the working capacity should be assessed dynamically, based on a complex postflight analysis of the pilot's activities observed by automatic flight parameter recording systems, along with an analysis of the relevant changes in the physiological functions of the pilot's body. Attention should be directed to the evaluation of the pilot's 'attention potentiality' and to the structure of his control movements through the use of the stabilizer and manual control. Such a complex evaluation is particularly suitable during intense flight duty, long interruptions between vacations, and mastering of a new skill. S.D.

A77-13073 # **On the possibility of using cephalography in aviation medical examination (O vozmozhnosti ispol'zovaniia kefalografii v tseliakh vrachebno-letnoi ekspertizy).** V. G. Bazorov. *Voenno-Meditsinskii Zhurnal,* Aug. 1976, p. 54-59. 6 refs. In Russian.

Experiments were conducted on 100 healthy subjects aged 16-35 yr of different occupations (candidate and professional pilots, surface transportation drivers, and individuals of various professions) to assess the capabilities of using cephalography for a quantitative evaluation of static equilibrium in the practice of aviation medicine, especially in flight medical examination. Three types of cephalograms are identified and discussed in terms of normal, asymmetrical, and irregular patterns. The last two types are observed in the case of well-defined phenomena of vestibular dysfunction. A rapid and straightforward technique using a special ruler is described for assessing the cephalograms obtained, the whole process of evaluation requiring about 5 min in all. A cephalogram index is proposed for exact characterization of disorders in static equilibrium. S.D.

A77-13074 # **Changes in the heart rate and cardiac rhythm upon exposure to flight stress (Izmeneniia chastoty i ritma serdechnykh sokrashchenii pod vliianiem letnoi nagruzki).** Iu. N. Karnaukhov and Iu. N. Shishmarev. *Voenno-Meditsinskii Zhurnal*, Aug. 1976, p. 59-61. In Russian.

Electrocardiography and mechanocardiography were applied to flight personnel subjects aged 18-45 yr to study the changes in the heart rate (HR) and cardiac function of these transport aircraft crewmembers during their performance of flight tasks, during the period between flights, and during 24 hours of postflight rest. The flight tests were performed at an altitude of up to 2000 m for about 3 hr on 19 subjects, composed of 7 captains, 6 copilots, and 6 navigators. A prestart HR enhancement is observed in all subjects due to mobilization of organic systems prior to forthcoming task. No in-flight arrhythmias were observed. Post-flight observations indicate that the captains and copilots exhibit the highest tendency of increase in the HR. Atrial extrasystole is observed in two captains, which disappeared in the period between flights and 12-24 hr after flight. Occurrence of extrasystoles points to the enhancement of myocardial excitation under the action of flight factors. S.D.

A77-13075 # **Postflight changes in heart rate and arterial pressure in pilots (Izmeneniia pul'sa i arterial'nogo davleniia u letchikov posle poletov).** N. N. Shorokhov. *Voenno-Meditsinskii Zhurnal*, Aug. 1976, p. 73-75. In Russian.

A77-13147 # **Biology and physics (Biologiia i fizika).** O. S. Davidov. *Akademiia Nauk Ukrains'koi RSR, Visnik*, vol. 40, Aug. 1976, p. 13-20. 9 refs. In Ukrainian.

The paper reviews some of the basic concepts of the biophysics of proteins and takes note of some recent developments in the study of the role of solitons in energy transport in protein molecules and in the investigation of the molecular mechanism of muscular contraction. The high efficiency of energy transfer by proteins observed during hydrolysis of ATP may be explained by the creation of exceptionally stable excitations of the soliton type in the alpha-spiral strips of protein molecules. A model is proposed for sarcomere contraction in which all parts of the myosin molecule are active elements. More than half the liberated energy of ATP hydrolysis is converted to kinetic energy of excitation, which is transferred to a soliton. P.T.H.

A77-13150 # **Autoimmune reactions to DNA in people of different age (Autoimunni reaktsii proti DNK u liudei riznogo viku).** A. P. Zaichenko (Akademiia Meditsinskikh Nauk SSSR, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 22, Sept.-Oct. 1976, p. 660-665. 35 refs. In Ukrainian.

Frequency and content of autoantibodies to DNA, skin reaction to intracutaneous administration of DNA solution, and the desoxyribonuclease activity of blood serum were measured in 288 people of different age and sex who were deemed to be healthy. The frequency and pronouncedness of the autoimmune reactions to DNA were found to increase with age. The peak of the automimmune reaction in men is observed to occur ten years earlier (at age 65) than in women (at age 75). The desoxyribonuclease activity of the blood serum decreases with age. In persons of advanced age, a certain decrease in the frequency of autoimmune reactions and increase in DNA-ase activity is observed in comparison to the age range 60-75 years. P.T.H.

A77-13152 # **Investigating the mechanisms of neurohumoral regulation (Do vivchennia mekhanizmiv neirogumoral'noi reguliatsii).** O. F. Makarchenko, R. S. Zlatin, and B. A. Roitrub (Akademiia Nauk Ukrains'koi RSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 22, July-Aug. 1976, p. 435-442. 34 refs. In Ukrainian.

The paper sheds light on methodological problems in the theory of neurohumoral regulation, which have arisen during experimental and clinical investigations conducted by the authors. The discussion covers the fundamental principles of regulation theory, philogenetical aspects of neurohumoral regulation, and concepts on the remote types of humoral regulation. Particular attention is directed to the role of conformational mobility of blood proteins in maintaining the homeostasis of the organism, along with the types of regulatory influence of the hypothalamus. Also discussed are the principles of stability and lability as well as the importance of the principle of reliability in the activity of neurohumoral systems. S.D.

A77-13153 # **Some possibilities of using the Sechenov effect of increasing working capacity to improve the functional state of the organism during motion sickness (Deiaki mozhlivosti Sechenovskogo efektu pidvishchennia pratsezdatnosti v polipshenni funktsional'nogo stanu organizmu pri 'khvorobi neresuvannia').** M. A. Litvins'kii (TsK DTSAAF, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 22, July-Aug. 1976, p. 548-551. 23 refs. In Ukrainian.

A77-13154 # **A preamplifier for electrophysiological investigations (Poperednii pidsiliuvach dlia elektrofiziologichnikh doslidzhen').** T. L. Davidovs'ka and V. M. Davidovs'kii (Kiivs'kii Derzhavnii Universitet, Kiev, Ukrainian SSR). *Fiziologichnii Zhurnal*, vol. 22, July-Aug. 1976, p. 561, 562. In Ukrainian.

A77-13155 # **Long-term adaptation of the heart to high-level stress (Dolgovremennaia adaptatsiia serdtsa k bol'shoi nagruzke).** F. Z. Meerson (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 7, July-Sept. 1976, p. 34-56. 84 refs. In Russian.

There exist two types of long-term adaptation of the heart to high-level stress: (1) cardiac adaptation to continuous-stress, which develops during all major circulatory diseases in the form of compensatory hypertrophy of the heart; and (2) cardiac adaptation to periodically applied stress, which develops during intensive physical work in the form of what is known as a trained heart. Both types are based on the activation of the synthesis of nucleic acids and proteins in the myocardium and regulatory system of the heart. However, the result of adaptation is different for each type of adaptation: the work that can be done by unit mass of myocardium is increased in the case of trained heart and decreased in the case of

compensatory hypertrophy, as compared to normal level. Emphasis is placed on elucidating the mechanism underlying this difference. A comparison is drawn between the metabolism, structure and function of the heart for these two types of cardiac adaptation. All the differences appear to be accounted for by events taking place on the genome level. S.D.

A77-13156 # **Electrophysiology of the hippocampus (Elektrofiziologiia gippokampa).** V. M. Shaban (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Uspekhi Fiziologicheskikh Nauk*, vol. 7, July-Sept. 1976, p. 57-81. 199 refs. In Russian.

The paper presents a review of experimental evidence on the electrophysiology of the hippocampus, available from Soviet and foreign literature. The characteristics of the morphological structure of the hippocampus are outlined. A detailed description is given of the electrophysiological properties of the hippocamp neurons, possible mechanisms of their interaction for excitation and inhibition, and the impact of certain cerebral structures on the electrical activity of the hippocampus. The overall electrical activity of the hippocampus is discussed as related to the electrohippocampogram and evoked potentials, along with hypotheses on the nature of these phenomena. The study demonstrates the significance of the observed evidence to gain insight into the functional organization of the hippocampus and to elaborate some fundamental problems in general electrophysiology. S.D.

A77-13187 # **Data on the change of human EEG rhythms under the action of electric stimuli /electric sleep/ (Nekotorye dannye ob izmenenii ritmov E.E.G. cheloveka pod deistviem elektrostimuliatsii /elektrosna/).** L. G. Voronin, V. F. Konovalov, and A. U. Fedorov (Akademiia Nauk SSSR, Institut Biologicheskoi Fiziki, Pushchino, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 1, 1976, p. 230-232. 5 refs. In Russian.

Changes of the alpha, delta and theta rhythms of four people, from 18 to 24 in age, conditioned by electrically induced sleep were recorded in an effort to study the development and mechanisms of such electric sleep. During electric sleep, a great increase (140-150% of the base value) was observed in the delta and theta activity of the cerebal cortex, while a great decrease (15-20% of the base value) was observed in the alpha rhythm. After electric stimulation was switched off, delta and theta activity decreased by 20-25%, while alpha activity increased by 50-55%. The effects of electric sleep on memory were also examined. B.J.

A77-13188 # **The effect of different volume rates of artificial blood circulation on the hemodynamics of an organism reanimated after death from asphyxia (Vliianie razlichnykh ob'emnykh skorostei iskusstvennogo krovoobrashcheniia na gemodinamiku organizma, ozhivliaemogo posle smerti ot asfiksii).** I. I. Lanovenko (Akademiia Nauk Ukrainskoi SSR, Institut Fiziologii, Kiev, Ukrainian SSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 1, 1976, p. 233-236. 15 refs. In Russian.

The hemodynamics of fifteen dogs that were reanimated by a method of artificial circulation after clinical death for 12-14 min was studied as a function of different blood volume rates: 197 plus or minus 26 milliliters/kg-min at the beginning of reanimation and 102 plus or minus 24 milliliters/kg-min at the end, for the first group; and 38 plus or minus 18 (at the beginning) and 20 plus or minus 6 milliliters/kg-min (at the end) for the second group. The following parameters were studied: cardiac output, the systolic index, the mean arterial pressure, heart rate, the working index of the left ventricle, and the peripheral resistance of the vessels. For the first group of dogs, it was found that the hemodynamic response was conditioned by a syndrome of hyperdynamics, while the second group was found to suffer from a primary insufficiency of blood circulation along with cessation of the homeometric and heterometric mechanisms of the self-regulation of heart activity. B.J.

A77-13189 # **Characteristics of the monocular estimation of the orientation of a line by the right and left eye and their possible neurophysiological mechanisms (Osobennosti monokuliarnoi otsenki orientatsii linii pravym i levym glazom i ikh vozmozhnye neirofiziologicheskie mekhanizmy).** L. I. Leushina and A. A. Nevskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 1, 1976, p. 237-240. 11 refs. In Russian.

An experiment was devised to determine the systematic errors associated with the monocular identification of line orientation on a tachistoscope. Lines were oriented vertically, horizontally, and obliquely at 45 degree angles to the left and right of the vertical, and were viewed by the right and left eyes of three subjects. A matrix method for determining incorrect identifications showed that in the case of two of the subjects, a shift in line orientation 45 degrees clockwise predominates for the left eye, while a 45 degree counterclockwise shift predominates for the right eye. Exactly opposite shifts are observed for the third subject. The effect of binocular and monocular stimulation on the magnitude of response of binocular neurons of the visual cortex is investigated in an effort to define the mechanisms for the observed pattern of systematic errors. B.J.

A77-13190 # **Principle of the invariance of the human auditory analyzer relative to scale change during the discrimination of tonal-impulse signals (Printsip invariantnosti slukhovogo analizatora cheloveka otnositel'no izmeneniia masshtaba pri razlichenii tonal'no-impul'snykh signalov).** V. A. Saprykin and Iu. K. Nikitin (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, July 1, 1976, p. 244-246. In Russian.

A77-13334 **Evolution of the neurons in vertebrates (L'évolution des neurones chez les vertébrés).** D. Bowsher (Liverpool, University, Liverpool, England). *La Recherche*, vol. 7, Nov. 1976, p. 935-944. 5 refs. In French.

Evolutionary inferences on the development of neuronal systems from lower to vertebrates are derived from comparative neuroanatomical/neurophysiological studies, in the absence of fossil evidence. While nerve systems for treatment of cutaneous sensorial information are basically similar in all vertebrates, even the most primitive, an evolutionary sequence in complexity of organization is traced in the parallel pathways of reticular neurons (responding to chemical stimuli and disturbances in gravitational equilibrium with epicritical sensibility) and lemniscal neurons (exhibiting protopathic sensibility). While the reticular organization is itself versatile and adaptive, the lemniscal organization confers enormous advantages on life forms forsaking the aquatic environment. R.D.V.

A77-13337 **The heart in slow motion (Le coeur au ralenti).** P. Perrier. *La Recherche*, vol. 7, Nov. 1976, p. 964, 965. In French.

An arrangement utilizing an ultrasonic imaging device which exerts no adverse effects on the cardiac patient, a laser beam, and an acousto-optic coupler, to produce immediate high-resolution in vivo images of heart action in depth is described. Ultrasonic information

is transferred to the laser beam, by interference with a material boasting of a high acousto-optic coupling coefficient. A mirror oscillating in step with the ultrasonic pulses makes it possible to direct the light beam instantaneously onto the appropriate region of a tapered variable-focal-length lens. Image rate can be adjusted from 50 images per second to 1500 images per second, with roughly 1.5 mm resolution in two dimensions. The outlook for improved cardiological imaging instrumentation of this type, possibly incorporating charge-coupling devices, and with reductions in price, is touched upon briefly. R.D.V.

A77-13507 **Influence of inflation and atelectasis on the hypoxic pressor response in isolated dog lung lobes.** E. J. Quebbeman (U.S. Veterans Administration Center, Wood, Wis.) and C. A. Dawson (Wisconsin, Medical College, Milwaukee, Wis.). *Cardiovascular Research*, vol. 10, Nov. 1976, p. 672-677. 17 refs. Research supported by the Wisconsin Heart Association. USVA Project 3415-02.

A77-13508 **Cardiovascular responses in man to a stream of cold air.** J. M. Hayward, W. F. Holmes, and B. A. Gooden (University Hospital, Nottingham, England). *Cardiovascular Research*, vol. 10, Nov. 1976, p. 691-696. 26 refs.

A77-13517 * **Formation of nucleoside 5'-polyphosphates under potentially prebiological conditions.** R. Lohrmann (Salk Institute for Biological Studies, San Diego, Calif.). *Journal of Molecular Evolution*, vol. 8, Oct. 27, 1976, p. 197-210. 16 refs. NASA-supported research; Grant No. NIH-GM-13435.

The characteristics and efficiencies of biochemical reactions involving nucleoside 5'-diphosphates and -triphosphates (important substrates of RNA and DNA synthesis) under conditions corresponding to the primitive prebiotic earth are investigated. Urea catalysis of the formation of linear inorganic polyphosphates and metal ions promoting the reactions are discussed. Linear polyphosphate was incubated with Mg(++) in the presence of a nucleoside 5'-phosphate, to yield nucleoside 5'-polyphosphates when products are dried, while Mg(++) prompts depolymerization to trimetaphosphate in aqueous solutions. Plausible biogenetic pathways are examined. R.D.V.

A77-13518 * **Response to comments on thermal polypeptides.** P. A. Temussi (Miami, University, Coral Gables, Fla.). *Journal of Molecular Evolution*, vol. 8, Oct. 27, 1976, p. 301-304; Reply, p. 305. 39 refs. Grant No. NGR-10-007-008.

A77-13586 # **Etiopathogenesis of motion sickness (K voprosu ob etiopatogeneze bolezni dvizheniia).** E. M. Iuganov and F. A. Solodovnik. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, July-Aug. 1976, p. 485-494. 82 refs. In Russian.

An analysis of results pertaining to numerous studies on the physiology of the vestibular system and certain areas of the central nervous system revealed that the predisposition of virtually healthy individuals to motion sickness is independent of the behavior of the receptor portion of the vestibular system, and is rather determined by the behavior of certain regions of the human brain, and particularly, of the limbic-reticular complex. Motion sickness appears to be a particular type of disorder of human adaptation, acting as an indicator of disorder in the integrated adjustment of individuals suffering from constitutionally acquired deficiency in the limbic-reticular structure. The proposed hypothesis on the etiopathogenesis of motion sickness will make it possible to examine anew the cause and development of this state and outline future research trends in the diagnosis, prevention, and treatment of motion sickness. S.D.

A77-13587 # **Adaptation of the organism to weightlessness (Adaptatsiia organisma k nevesomosti).** I. I. Kas'ian. *Akademiia Nauk SSSR, Izvestiia, Seriia Biologicheskaia*, July-Aug. 1976, p. 495-508. 14 refs. In Russian.

The paper discusses experimental results obtained during numerous flights of subjects and cosmonauts aboard special aircraft and spacecraft. It is shown that in all the cases considered, adaptation of the organism to weightlessness occurs in both parabolic and orbital flights. Repeated stays aboard flight vehicles resulted, as a rule, in speeding up the process of adaptation. S.D.

A77-13701 **Urinary catecholamine excretion on acute induction to high altitude /3,658 m/.** R. S. Hoon, S. C. Sharma, V. Balasubramanian, K. S. Chadha, and O. P. Mathew (Indian Armed Forces, Medical Services, New Delhi, India). *Journal of Applied Physiology*, vol. 41, Nov. 1976, pt. 1, p. 631-633. 10 refs.

Fifty healthy male volunteers, 21-34 yr of age, normally resident at altitudes less than 1000 m, were airlifted to 3658 m. Urinary excretion of catecholamines was measured at sea level (198 m) and on the 1st, 2nd, 4th, and 10th day of a stay at high altitude. The symptoms observed on exposure to high altitude were assigned arbitrary scores. The volunteers could, on this basis, be divided into symptomatic and asymptomatic groups. The two groups showed a markedly different pattern of urinary catecholamines excretion on exposure to high altitude and on return to sea level. Significant increase in the catecholamine excretion was observed in the symptomatic group only. A possible role for enhanced sympathoadrenal activity in the etiopathogenesis of high-altitude illnesses is postulated. (Author)

A77-13702 **Human coagulation abnormalities during acute exposure to hypobaric hypoxia.** J. T. Maher (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.), P. H. Levine (Memorial Hospital, Worcester, Mass.), and A. Cymerman (Massachusetts, University, Worcester, Mass.). *Journal of Applied Physiology*, vol. 41, Nov. 1976, pt. 1, p. 702-707.

Multiple coagulation studies were carried out in eight healthy young men at sea level (SL) and after 1, 24, and 48 hr at a simulated altitude of 4400 m. Platelet aggregation, as induced by ADP, epinephrine, and collagen, was not significantly altered by high-altitude (HA) exposure. Mean 2,3-diphosphoglycerate, a physiological inhibitor of platelet aggregation, rose (P less than 0.001) after 24 hr at HA and remained elevated while no changes in circulating catecholamines were observed. Platelet count, factor III availability, and membrane lipid peroxide formation were likewise unaltered at HA, as were prothrombin and thrombin times and protamine paracoagulation test. However, mean partial thromboplastin time was significantly shortened after 1 and 24 hr at HA, recovering to SL control by 48 hr. Fibrinogen and factor VIII levels also fell after 1 hr at HA but returned to the pre-exposure values by 24 hr. Fibrin degradation products were transiently detectable in three subjects at

A77-13703 **Effect of heat acclimatization on intravascular responses to acute heat stress in man.** R. M. Bonner, M. H. Harrison, C. J. Hall, and R. J. Edwards (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Journal of Applied Physiology*, vol. 41, Nov. 1976, pt. 1, p. 708-713. 32 refs.

A77-13791 # **Quantitative value of skin thermoreceptor firing in thermoregulation mechanisms from data on unanesthetized animals (Kolichestvennoe znachenie impul'satsii termoretseptorov kozhi v mekhanizmakh termoreguliatsii po dannym na nenarkotizirovannykh zhivotnykh).** K. P. Ivanov, V. A. Konstantinov, N. A. Malovichko, and N. K. Danilova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, Aug. 21, 1976, p. 1488-1491. 8 refs. In Russian.

A77-13792 # **Synaptic contacts in the vestibular ganglion of the eighth cranial nerve of the frog (Sinapticheskie kontakty v vestibuliarnom ganglii VIII nerva liagushki).** T. F. Kuleshova (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, Aug. 21, 1976, p. 1492-1495. 14 refs. In Russian.

A77-13829 # **Human factors and flight deck design.** J. M. Rolfe (RAF, London, England). *Aircraft Engineering*, vol. 48, Nov. 1976, p. 6-9, 11-14, 22 refs.

Criteria guiding cockpit and flight deck design for man-in-the-loop operation are outlined, with discussions of physiological/psychological factors, anthropometric variation, and decisions on visual or audible messages. Functions performed better by men than by machines, or vice versa, are listed with comments. Vision and eye motion, hearing, feel and response to motor activity, freedom of motion, and average body size differences in various geographical regions are discussed, in relation to work efficiency and comfort. Percentile values for sitting height of males from various geographical regions are plotted graphically. Guidelines for deciding upon visual or audible flight deck messages and data display are presented. Physical dimensions of anthropometric variables important in cockpit design are tabulated. A cockpit assessment checklist is appended. R.D.V.

A77-13850 **Vision and acquisition: Fundamentals of human visual performance, environmental influences and applications in instrumental optics.** I. Overington (British Aircraft Corp., Guided Weapons Div., Stevenage, Herts., England). Research sponsored by the British Aircraft Corp. London, Pentech Press, Ltd.; New York, Crane, Russak and Co., Inc., 1976. 391 p. 1040 refs. $32.50.

The present work is concerned with the basic principles of the human visual system, threshold behavior in simple acquisition situations, the effects of imperfections in image quality and of complex stimulus structure, and external influences due to the atmosphere and surface reflectance properties. Special attention is directed to a discussion of the acquisition problem in typical practical field situations and the possibilities of providing adequate simulation in the laboratory. A widely versatile yet simple model of the visual processes for threshold detection of simple objects in plain fields is developed, which is also able to predict detection thresholds in a variety of complex field situations and certain simple recognition thresholds. The model can be used for threshold modeling in an empty field search situation and for interpretation of instrumentally measured image quality of optical aids. The units used throughout the book are the SI system. S.D.

A77-14049 **The contribution of the EUROCONTROL Institute of Air Navigation Services towards standardising the training of controllers.** *Eurocontrol*, vol. 3, no. 6, 1976, p. 23-26.

A77-14151 # **Threshold time of visual recognition and level of light adaptation (Porogovoe vremia zritel'nogo opoznaniia i uroven' svetovoi adaptatsii).** V. M. Kamenkovich (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Mar.-Apr. 1976, p. 223-227. 16 refs. In Russian.

Experiments were conducted on ten healthy adult subjects of both sexes with normal vision to study the dependence of threshold time for recognition of geometrical figures on the level of light adaptation under tachistoscopic presentation of the test stimuli. Adaptive changes in the threshold time for recognition of geometrical figures are revealed, which are different for central and peripheral vision. The trend of these changes is indicative of the training of the recognition function of the eye in the range of low levels of illumination. The results obtained support the hypothesis on the universality of the adaptive reorganization of the sensory fields of the eye. The existence of an optimal range of background illumination may be of practical significance in organizing the workspace of a human operator. S.D.

A77-14152 # **A property of the control system for the tracking movements of the human eye (Ob odnom svoistve sistemy upravleniia slediashchimi dvizheniiami glaz).** B. A. Karpov (III Leningradskaia Psikhiatricheskaia Bol'nitsa, Leningrad; Akademiia Nauk SSSR, Laboratoriia Protsessov Zritel'nogo Vospriiatiia, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Mar.-Apr. 1976, p. 228-240. 31 refs. In Russian.

The tracking characteristics of the human eye are investigated by recording the eye movements of healthy subjects assigned to track a rhythmically moving target that may be in a continuous-periodical (sinusoidal and triangular) motion, noncontinuous-periodical (rectangular) motion, or include smooth or interrupted components of motion. It is shown that the eye is capable of exhibiting smooth movements of follow-up both during continuous-periodical types and during noncontinuous-periodical types of target motion. Particular attention is given to a discussion of the role of target motion rhythm in the development of smooth movements of visual tracking when the input signal lacks such characteristics as velocity and acceleration which are considered to be necessary for the occurrence of smooth tracking movements of the human eye. S.D.

A77-14153 # **Investigation of the auditory function during transversally directed acceleration (Issledovanie slukhovoi funktsii pri poperechno napravlennom uskorenii).** V. E. Grishanov. *Fiziologiia Cheloveka*, vol. 2, Mar.-Apr. 1976, p. 247-252. 12 refs. In Russian.

A77-14154 # **Mimical and vegetative components of emotional state (Mimicheskie i vegetativnye komponenty emotsional'nogo sostoianiia).** M. N. Rusalova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, Mar.-Apr. 1976, p. 273-281. 17 refs. In Russian.

The paper is concerned with a study of techniques for the dynamic diagnosis of human emotional state. The qualitative characteristics of emotional state, which arise from mental representation of various situations, were determined by EMG of facial muscles in conjunction with recordings of ECG and respiration. Experiments were conducted on dramatic arts students, actors, while the control group consisted of individuals from other professions. Three testing versions were used: (1) mental representation of four emotional states - joy, fear, anger, and sadness for events concerning

the subject himself; (2) masking of these emotional states; and (3) imitation of such emotional states without emotional experience. It is shown that mental representation of emotion-involving events results in changes in the activity of the mimical muscle of the face and indices of the autonomic nervous system, depending on the type of emotion. Each of the emotional states considered exhibits a characteristic EMG pattern. S.D.

A77-14155 # **Bioelectrical activity of the brain during prolonged hypokinesia in the antiorthostatic position (Bioelektricheskaia aktivnost' mozga pri dlitel'noi gipokinezii v antiortostaticheskom polozhenii).** Z. A. Pokrovskaia, O. G. Rossinskii, and E. A. Shaposhnikov (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 2, Mar.-Apr. 1976, p. 318-324. 9 refs. In Russian.

A77-14156 # **Characterization of the transitory state from wakefulness to somnolence from EEG data (Kharakteristika perekhodnogo sostoianiia ot bodrstvovaniia k dremote po dannym EEG).** L. M. Puchinskaia, O. M. Grindel', E. M. Bakar, and L. D. Volkova (Akademiia Nauk SSSR, Institut Vysshei Nervnoi Deiatel'nosti i Neirofiziologii; Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 2, May-June 1976, p. 347-353. 14 refs. In Russian.

The paper is concerned with a statistical study of the parameters pertaining to the frequency analysis of the EEG of the occipital and central regions in the brain of healthy adult subjects in the state of wakefulness, transition to somnolence, and somnolence. It is shown that the transitory state can be differentiated from related states by a variety of indicators: mean level of alpha-activity, amplitude variation coefficient of high-frequency rhythms (alpha, low-beta, high-beta), and the cross correlation coefficient of total energy and the alpha component of the biopotentials of the occipital and central regions. In particular, an increase in the correlation coefficient between the occipital and central regions with respect to total energy and to the alpha rhythm may be regarded as a characteristic feature of the transitory state. S.D.

A77-14157 # **Movement as an active factor in the organization of sleep (Dvizheniia kak aktivnyi faktor v organizatsii sna).** A. Ts. Gol'bin and Iu. A. Stupnitskii (Gorodskoe Spetsializirovannoe Otdelenie po Lecheniiu Nevrozov, Leningrad, USSR). *Fiziologiia Cheloveka,* vol. 2, May-June 1976, p. 354-361. 16 refs. In Russian.

Experiments were carried out on 6 healthy subjects aged 14-16 yr and 12 patients aged 10-16 yr and afflicted with the 'swaying' syndrome with a view toward studying their behavioral and electropolygraphical patterns of sleep and wakefulness. Repeated studies of night sleep revealed a regular periodicity in sleeping pose, which is individually constant for each healthy subject. In addition, maximum number of motor, somatovegetative, and vocal responses are observed during paradoxical sleep and transitory states, and minimum number during the 3rd stage of sleep. An analysis of sleep characteristics in the patients with the swaying syndrome supports the hypothesis on the compensatory role of these swaying movements which, according to the principle of positive feedback, contribute to the activation of functionally weak synchronizing systems in the brain. Of particular importance is the drastically reduced activity of the vestibular system in the patients with the swaying syndrome. S.D.

A77-14158 # **General and local changes in the bioelectrical activity of the brain during mental activity (Obshchie i lokal'nye izmeneniia bioelektricheskoi aktivnosti mozga vo vremia psikhicheskoi deiatel'nosti).** E. D. Khomskaia (Moskovskii Gosudarstvennyi Universitet; Akademiia Nauk SSSR, Institut Psikhologii, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 2, May-June 1976, p. 372-385. 143 refs. In Russian.

The paper presents a review of available theoretical and experimental evidence on the variation of the bioelectrical activity of the brain during mental activity such as performance of various psychological tests. Particular attention is given to general (generalized) and local (specific) changes in the various indices of the bioelectrical activity in different regions of the brain. These indices concern the frequency-amplitude changes in EEG, evoked potentials, spatial synchronization of biopotentials, and the like. Included in the discussion is the role of the frontal areas of the brain as well as the right and left hemispheres in achieving different types of mental activity. Evidence is presented in support of the integral or systemic nature of the bioelectrical activity of cortical and subcortical structures during mental activity. S.D.

A77-14159 # **Interrelationship between the parameters of evoked potential and the structure of sensory-perceptive process (Vzaimootnosheniia mezhdu parametrami vyzvannogo potentsiala i strukturoi sensorno-pertsentivnogo protsessa).** A. M. Ivanitskii and L. V. Matveeva (Nauchno-Issledovatel'skii Institut Sudebnoi Psikhiatrii, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 2, May-June 1976, p. 386-399. 38 refs. In Russian.

A psychophysiological experiment was conducted to determine the extent to which the parameters of evoked potential reflect the structure of sensory-perceptive process and to assess the possibility of using the evoked potential as an objective indicator of the sensory and extrasensory factors of perception. The results support the hypothesis that the parameters of evoked potential may be regarded as an objective indicator for the dynamic interaction of two types of information during acquisition and processing of sensory information. The proposed hypothesis is verified using signal detection theory which permits a qualitative evaluation of the sensory (analyzer sensitivity) and extrasensory (decision making) components of the sensory-perceptive process. The early components of evoked potential show a positive correlation with the indice of sensory sensitivity, whereas the late waves of evoked potential correlate with the criterion of decision making. S.D.

A77-14160 # **Memory and the functional state of the brain (Pamiat' i funktsional'noe sostoianie mozga).** A. M. Vein and B. I. Kamenetskaia (I Moskovskii Meditsinskii Institut, Moscow, USSR). *Fiziologiia Cheloveka,* vol. 2, May-June 1976, p. 400-406. 11 refs. In Russian.

Results are presented for an experimental psychological study of memory in 471 patients with damaged temporal, hypothalamo-mesencephalic, and stem structures of the brain. Attention is focused on the functional stresses directed toward increasing the wakefulness level and addressed to the emotional sphere of the patient. The results were submitted to computer-aided statistical and correlation analyses. A major conclusion is the existence of obvious memory failure during local lesions of the cited structures as related to the functional state of the brain. It is suggested that correct understanding of the genesis of memory disorders requires consideration of both the focus of cerebral lesion and the functional state of the brain. S.D.

A77-14161 # **Human recognition of different types of acoustic signals emitted by monkeys /Cebus capucinus/ (Raspoznavanie chelovekom raznykh tipov zvukovykh signalov, izdavaemykh obez'ianami /Cebus capucinus/).** G. V. Gershuni, B. V.

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Bogdanov, O. Iu. Vakarchuk, V. P. Mal'tsev, and T. V. Chernigovskaia (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 407-418. 11 refs. In Russian.

An experimental study of human recognition of sounds produced by monkeys (Cebus capucinus) in different behavioral situations revealed eight types of emitted acoustic signals. Each type of signal was characterized by a set of parameters assigned by the human subject to the signal perceived and belonging to the following classes: vowel-like, consonant-like, mixed (vowel + consonant), emotionally positive, emotionally negative, and emotionally neutral. The tone-pitch characteristics of the signals were divided into three classes: melodic, noisy, and mixed. A large number of responses are analyzed by similarity and the results are presented in matrices which define the classification of the signals produced by the animals. Recognition data are found to compare well with physical characteristics of the signals. S.D.

A77-14162 # **Stressful mental activity and the regulatory state in the cardiovascular system (Napriazhennaia umstvennaia deiatel'nost' i sostoianie reguliatsii serdechno-sosudistoi sistemy).** Iu. I. Kundiev, A. O. Navakatikian, L. I. Tomashevskaia, V. S. Derkach, and A. I. Kovaleva (Kievskii Institut Gigieny Truda i Profzabolevanii, Kiev, Ukrainian SSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 433-440. 45 refs. In Russian.

In-vivo and in-vitro experiments were conducted on subjects of both sexes aged 25-45 yr to study relevant regulatory parameters of cardiovascular functions during stressful mental activity involving such elements as time pressure, risk, and threat of electroshock penalty. The measurements were obtained by radiotelemetric recording of the cardiac rhythm, polycardiography, mechanocardiography, along with evaluation of circadian rhythm for excretion of epinephrine, norepinephrine, and corticosteroid-17. Subjective evaluation of stress was made by a ranking method. It is shown that mental activity involving high stress is accompanied by changes in the intrasystemic coordination of the functions of the cardiovascular system and retuning of the rhythmic regulation of cardiac activity. The study also revealed an enhancement of adrenergic influences and changes in the circadian rhythm pertaining to the hormonal excretion of the sympathoadrenal system. S.D.

A77-14163 # **Functional states of the human operator during monotonous work (Funktsional'nye sostoianiia cheloveka-operatora pri monotonnoi rabote).** L. G. Voronin, M. E. Kramnik, L. F. Solov'eva, and D. M. El'bert (Moskovskii Gosudarstvennyi Universitet, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 441-445. 7 refs. In Russian.

Results are presented for an experimental study of the fluctuations of the working capacity of a human operator assigned to perform a monotonous task in a man/machine system. Continuous recording of the functional state parameters was achieved for prognosis of successful performance. Three types of human operator activity were simulated: simple sensorimotor responses, perception and evaluation of alphabetic information, and solution of mental tasks. The results indicate that monotonous working conditions produce drowsiness, thereby sharply degrading the quality of all the tasks performed. The optimal functional states which ensure highest working capacity are found to be different for different kinds of human activity. The most reliable and informative indicator for prognosis of successful performance is shown to be the frequency of background EEG rhythm. ECG, EOG, and GSR can only be viewed as supplementary indicators. S.D.

A77-14164 # **Local and spatial variations of the alpha-component in the EEG of human operators during task performance (Lokal'nye i prostranstvennye izmeneniia al'fa-sostavliaiushchei EEG operatorov v protsesse deiatel'nosti).** A. V. Miroliubov (Voenno-Meditsinskaia Akademiia, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 456-463. 24 refs. In Russian.

Experiments were conducted on 12 healthy male subjects aged 21-30 yr to study their EEG in three left unipolar leads (frontal, parietal, and occipital) during tracking of a stereotyped sinusoidal signal. The EEG results were submitted to a cross-correlation analysis. It is found that the EEG of a human operator performing a tracking task is marked by the proximity of the mean periods and the duration of the ascending phases of the alpha waves recorded in the left frontal, parietal, and occipital leads, along with spatial synchronization of the biopotentials of the cerebral regions considered. Tracking performance is associated with the co-tuning of the buildup rate of the alpha-wave amplitudes. S.D.

A77-14165 # **Seasonal changes in the functional activity of peripheral blood lymphocytes in man (O sezonnykh izmeneniiakh funktsional'noi aktivnosti limfotsitov perifericheskoi krovi cheloveka).** V. I. Purin', P. G. Nazarov, I. M. Vorontsov, and B. N. Sofronov (Akademiia Meditsinskikh Nauk SSSR; Ministerstvo Zdravookhraneniia, Pediatricheskii Meditsinskii Institut, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 464-468. 17 refs. In Russian.

A77-14166 # **The problem of adaptive bioregulation of human physiological functions and its clinical significance (Problema adaptivnogo bioregulirovaniia fiziologicheskikh funktsii cheloveka i ee klinicheskoe znachenie).** N. V. Chernigovskaia (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 496-506. 15 refs. In Russian.

The paper examines the theoretical and clinical significance of adaptive bioregulation of involuntary functions in man. Particular attention is devoted to the possibility of regulating the bioelectrical activity of the human brain in healthy subjects and in patients afflicted with diseases of the central nervous system. The general methodological approaches to adaptive bioregulation are based on the theory of conditioned reflexes, homeostasis, and concepts on autoregulation of physiological functions. Examples of regulation of human motor and autonomic activities are discussed. It is shown that adaptive regulation is associated with retuning of coordinations between the organic systems being regulated. S.D.

A77-14167 # **Algorithms for the stereotactic computer-atlas of the brain (Algoritmy stereotaksicheskogo EVM atlasa golovnogo mozga).** D. K. Annaraud and V. V. Usov (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 507-516. 10 refs. In Russian.

The paper outlines the principles for the development of computer-generated spatial numerical model of the various structures of the human brain. In order to account for dimensional variabilities of the brain, algorithms are proposed which ensure approximating the structural contours of an actual brain by surfaces defined in the numerical model. This is of paramount importance for the success of a stereotactic surgery in an individual patient. S.D.

A77-14168 # **A device for automatic input into a computer of experimental data on acoustic signal recognition (Ustroistvo dlia avtomaticheskogo vvoda v EVM dannykh eksperimentov po opoznavaniiu zvukovykh signalov).** O. Iu. Vakarchuk (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 517-520. 6 refs. In Russian.

A77-14169 # **Pulse technique for determining the electroconductivity of brain tissue (Impul'snyi metod opredeleniia elektroprovodnosti tkani mozga).** Iu. V. Khon (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, May-June 1976, p. 521-524. 12 refs. In Russian.

Clinicophysiological studies necessitate the use of a technique for determining the electrical resistance of brain tissue in the vicinity of the working surface of the electrode used, under rectangular-pulse operation with parameters close to actual ones during electrical stimulation of various cerebral structures for diagnostics and treatment purposes. A pulse technique for measuring the transient electrical resistance of electrode-brain tissue is described and tested on patients with parkinsonism, provided with long-term implanted electrodes. Particular attention is given to the design of the equivalent circuit through direct modeling with RC components. The proposed pulse technique revealed a high stability in the electroconducting properties of the brain tissue. S.D.

A77-14170 # **Slow electrical processes as indicator of the dynamics of functional state in the deep structures of the brain (Medlennye elektricheskie protsessy kak pokazatel' dinamiki funktsional'nogo sostoianiia glubokikh struktur golovnogo mozga).** L. S. Iablukian (Akademiia Meditsinskikh Nauk SSSR, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 549-557. 24 refs. In Russian.

Neurophysiological experiments using implanted electrodes were conducted to study the trend of changes in the slow electrical processes (SEP) in subcortical structures in patients with parkinsonism during diagnostic and therapeutic treatments. It is shown that SEP are capable of acting as a physiological indicator for objective evaluation and prediction of functional-state dynamics both during diagnosis and therapy applied to patients with motor disturbances. Attention is focused on the arousal level estimated by the pronouncedness and spreading of responses of extra-slow SEP fluctuations to the activation of attention and emotionally significant tests. S.D.

A77-14171 # **Time of recognition, threshold time of display, and masking duration of patterns (Vremia uznavaniia, porogovoe vremia pred'iavleniia i dlitel'nost' maskirovaniia izobrazhenii).** V. M. Krol' and L. I. Tanengol'ts (Akademiia Nauk SSSR, Institut Problem Upravleniia, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 566-570. 16 refs. In Russian.

Tachistoscopic experiments were carried out on five healthy subjects aged 22-25 yr to measure their motor reaction time to the display of single objects, line segments of different orientation, and light flashes. The threshold time of display necessary for pattern recognition is determined, along with maximum and minimum recognition time for the alphabet considered. A hypothesis is advanced that brightness and noise maskings have a surface effect and act only in the very early phases of the recognition process. S.D.

A77-14172 # **Relation between the size of visual image and its estimation (O zavisimosti mezhdu razmerom zritel'nogo izobrazheniia i ego otsenkoi).** M. B. Pavlovskaia (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 571-578. 9 refs. In Russian.

Monocular tachistoscopic experiments were performed on human subjects to study the conversion of physical metrics for the true size of a given object to subjective-estimation metrics. Particular attention is given to establishing the type of image scaling in the human visual system. Size scaling was achieved by three methods: (1) method of selecting the average size between two reference values; (2) multiplication method for selecting the size greater than a reference value by a certain factor; and (3) fractionation method for selecting the size less than a reference value by a certain factor. It is shown that experimental findings compare well with the hypothesis on a power function for the conversion of physical metrics of size to subjective metrics with an exponent less than unity. S.D.

A77-14173 # **Investigation of the throughput of the auditory analyzer in persons of different age groups (Issledovanie propusknoi sposobnosti slukhovogo analizatora u liudei razlichnykh vozrastnykh grupp).** A. I. Lopotko (Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR) and A. A. Sagal (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 586-592. 12 refs. In Russian.

The paper presents a procedure based on Jacobson's (1951) acoustic concepts and results for the evaluation of age-related changes in the throughput of the human auditory analyzer from audiometric data. The study determined the number of signals discriminable in frequency and intensity within the 'auditory field' of individuals ranging in age between 16-19 and 94 yr. It is found that with increasing age the auditory throughput approximates a linear relation with a falling gradient of 0.05 bit/sec per year for simple signals and 0.5 bit/sec per year for multicomponent signals. S.D.

A77-14174 # **Vibrational tonic reflex and postural position (Vibratsionnyi tonicheskii refleks i polozhenie tela).** M. L. Latash and V. S. Gurfinkel' (Moskovskii Fiziko-Tekhnicheskii Institut, Dolgoprudnyi, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 593-598. 13 refs. In Russian.

Electromyographic experiments using surface electrodes were conducted on m.rectus femoris and m.biceps femoris in six healthy subjects during vibrational stimulation of the quadriceps tendon. The effect of postural position on the vibrational tonic reflex (VTR) is discussed for various positions of the body. Changeover type effects during vibrational stimulation of the quadriceps tendon are demonstrated, which are comparable to reciprocal inhibition. VTR is shown to depend on the mutual position of body parts along with their spatial position. VTR can be suppressed by foot pressure on the support. No unique dependence of VTR on muscle length is revealed. S.D.

A77-14175 # **Nature of tendon reflex (O prirode sukhozhil'nogo refleksa).** Ia. M. Kots (Institut Fizicheskoi Kul'tury, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 599-610. 52 refs. In Russian.

The nature of the Achilles tendon reflex in man is studied by comparing the changes occurring in this response and the electrically induced monosynaptic H-reflex in various experimental situations. It is found that in a resting man the Achilles tendon reflex has smaller amplitude than the H-reflex. A major conclusion is that unlike the H-reflex, the Achilles reflex lacks the post-tetanic potentiation typical of monosynaptic reflexes. The absence of post-tetanic potentiation in the Achilles reflex may be attributed either to the polysynaptic nature of this reflex or to a subthreshold afferent unit, or even to a combination of these two factors. S.D.

A77-14176 # **Investigation of reflex excitability of motoneurons for two types of cyclic human motion (Issledovanie reflektornoi vozbudimosti motoneironov pri dvukh tipakh tsiklicheskikh dvizhenii u cheloveka).** A. V. Syrovegin and M. G. Sirota

(Ministerstvo Zdravookhraneniia SSSR, Nauchno-Issledovatel'skii Institut Gigieny Vodnogo Transporta, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 611-618. 17 refs. In Russian.

A77-14177 # **Formation of the cholinergic activity of blood in the human body - Distant action of acetylcholine (Formirovanie kholinergicheskoi aktivnosti krovi v organizme cheloveka - O distantnom deistvii atsetilkholina).** G. N. Kassil', G. Ia. Gebel', R. A. Sokolinskaia, A. N. Dasaev, and V. V. Chestukhin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Fizicheskoi Kul'tury; Ministerstvo Zdravookhraneniia SSSR, Institut Transplantatsii Organov i Tkanei, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 626-632. 20 refs. In Russian.

A77-14178 # **Investigation of the latent structure of cardiac rhythm dispersion in the human operator (Issledovanie latentnoi struktury dispersii serdechnogo ritma cheloveka-operatora).** A. M. Zingerman, M. M. Kislitsin, D. N. Menitskii, O. M. Kalinin, and Iu. S. Rozhkov (Akademiia Meditsinskikh Nauk SSSR; Leningradskii Gosudarstvennyi Universitet, Leningrad, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 639-645. 18 refs. In Russian.

A77-14179 # **Activity of the digestive system during 49-day antiorthostatic human hypokinesia (Deiatel'nost' pishchevaritel'noi sistemy pri 49-sutochnoi antiortostaticheskoi gipokinezii cheloveka).** K. V. Smirnov, L. G. Goland, I. L. Medkova, V. V. Murashko, and T. A. Sokolova. *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 653-660. 39 refs. In Russian.

A77-14180 # **Objective techniques for investigation of human vision (Ob'ektivnye metody issledovaniia zreniia cheloveka).** V. F. Ananin (Vsesoiuznyi Nauchno-Issledovatel'skii Institut Meditsinskogo Priborostroeniia, Moscow, USSR). *Fiziologiia Cheloveka*, vol. 2, July-Aug. 1976, p. 693-696. In Russian.

The paper gives a brief description of several devices designed to record the parameters of the human visual analyzer, based on the principle of optical scanning of images followed by their conversion to a measurable electric signal. The discussion covers the design of a nystagmograph, a binocular recorder of ocular micromovements and papillary reflex, and a device for recording the accommodation response of the eye. Other devices include a recorder of the size of superficial ocular vessels, a recorder for intraocular blood pressure and tonography, and a device for objective recording of the visual field. Automated processing of the output signals is achieved through the use of minicomputer and programmed computer. The devices described have undergone successful clinical testing in different medical centers. S.D.

A77-14420 # **Callosal transfer of deep impulses from different receptors (Transfer callosale d'impulsi profondi di diversa origine recettoriale).** T. Manzoni, S. Michelini, and G. Spidalieri (Ferrara, Università, Ferrara, Italy). *Accademia Nazionale dei Lincei, Atti, Rendiconti - Classe di Scienze Fisiche, Matematiche e Naturali*, vol. 58, Apr. 1975, p. 656-661. 11 refs. In Italian. Research supported by the Consiglio Nazionale delle Ricerche.

Experiments consisting of the stimulation of some forelimb nerves and nerve branches of anaesthetized cats were performed to determine the peripheral origin of Group I-III deep afferent fibers, which are known to be linked to the somesthetic region of the corpus callosum. Mass potentials were recorded simultaneously from the dorsal root, from the surface of the contralateral post-central dimple area, and from fibers of the corpus callosum. Results indicate that the callosal transfer of deep information is significant only if it originates from extramuscular receptors (such as those in joints or interosseous membranes) or from nonfusal muscular terminals. B.J.

A77-14447 # **Evolution with age of the transmission capacity of the acoustic analyzer in man (Vozrastnaia evoliutsiia propusknoi sposobnosti slukhovogo analizatora cheloveka).** A. I. Lopotko and A. A. Sagal (Leningradskii Sanitarno-Gigienicheskii Meditsinskii Institut, Leningrad, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 230, Sept. 1, 1976, p. 234-236. 9 refs. In Russian.

The information capacity of the acoustic analyzer is chosen as an integrative characteristic for studying the evolution with age of the human acoustic analyzer. The information (transmission) capacity C is defined as the logarithm (base 2) of the number of signals distinguishable in the system. Sensitivity to pitch and loudness of tone pulses was measured in subjects in eight age groups from 16 yrs to over 90 yrs. A fairly simple linear dropping off of the transmission capacity of the acoustic analyzer with the age of the subjects was noted. P.T.H.

A77-14462 # **The effect of free radical process inhibitors on the dark- and photo-induced electron paramagnetic resonance signals of melanoprotein granules of the pigmented epithelium of the eye (O vliianii ingibitorov svobodnoradikal'nykh protsessov na temnovoi i fotoindutsirovannyi signaly E.P.R. melanoproteinovykh granul pigmentnogo epiteliia glaza).** N. L. Sakina, M. A. Ostrovskii, V. A. Sharpatyi, and L. D. Smirnov (Akademiia Nauk SSSR, Institut Khimicheskoi Fiziki, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 229, Aug. 1, 1976, p. 1001-1003. 9 refs. In Russian.

A77-14467 # **Hormonal regulation of the state of the lysosomal membranes of the eye tissues (Gormonal'naia reguliatsiia sostoianiia lizosomal'nykh membran tkanei glaza).** B. S. Kasavina, T. V. Ukhina, and T. D. Churakova (Moskovskii Nauchno-Issledovatel'skii Institut Glaznykh Boleznei, Moscow, USSR). *Akademiia Nauk SSSR, Doklady*, vol. 228, June 11, 1976, p. 1226-1229. 15 refs. In Russian.

The effects on the lysosomal membranes of the eye of the following hormones were studied using sixty rabbits as test subjects: adrenaline, somatotrophic hormone, thyroxin, thyreotrophic hormone, hydrocortisone, deoxycorticosterone, and testosterone. The effect of the hormones was evaluated on the basis of changes in the general and free activity of lysosomal glycosidases in the subcellular structures of the tissues examined. Electron microscopy performed on the subcellular structures of the eye tissues demonstrated that the lysosomes are distinguished according to electron density and size. Results showed that all the hormones tested changed the lysosomal glycosidase activity as compared with the control one hour after application of hormones, but that different hormones had different effects. B.J.

A77-14566 **Perceptual analysis of moving patterns.** J. Hochberg and P. Fallon (Columbia University, New York, N.Y.). *Science*, vol. 194, Dec. 3, 1976, p. 1081-1083. 5 refs. Grant No. NIH-R01-HD-06768-01A1.

Configurations of moving points are often perceptually analyzed into relative and common vectors that are different from the actual

motions. If a movement configuration is abruptly replaced by a test point whose objective velocity continues the apparent (but illusory) course of one of the original points, observers perceive that course as uninterrupted and colinear. This finding provides a quantitative measure of the vector extraction phenomenon and was used to show that neither of the two current models adequately fits that phenomenon. (Author)

A77-14582 # **Ergonomics and space medicine (Ergonomika i kosmicheskaia meditsina).** I. Rudnyi and I. Pestov. *Aviatsiia i Kosmonavtika*, no. 7, 1976, p. 34, 35. In Russian.

Immediate and secondary effects of prolonged weightlessness under expected or already-tested space station conditions are discussed, along with a general discussion of spacecraft ergonomic problems. Adaptation of the human body to weightlessness, engineering adaptation of instruments and spacecraft furnishings to weightlessness, and adaptation of the machine-human system to weightlessness are emphasized. Medical tests as part of the planning for prolonged residences in orbit or in deep space, and ways of coping with shifted loads on human organs and atrophy or deconditioning of human organs and structures under weightlessness conditions, are also discussed. Principal factors to be considered in ergonomic design are outlined and some ergonomic defects encountered in space flights and spacecraft to date are mentioned. R.D.V.

A77-14626 **Effects of the frequency content in complex air shock waves on lung injuries in rabbits.** C.-J. Clemedson and A. Jonsson (Forsvarets Forskningsanstalt, Sundbyberg, Sweden). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1143-1152. 15 refs.

Rabbits were exposed in a nearly closed compartment to complex air shock waves of long duration and low overpressure. Severe lung injuries were observed at overpressures that, according to criteria applicable to simple waveforms, should have caused no primary lung injury. Pressure-time functions near the thorax and, in some cases, within the thorax, were recorded. The former functions were subjected to spectral analysis, and were also used for calculating with mathematical models the response of the thorax of man and rabbit, respectively. Recorded and calculated pressure-time functions in the lungs of the rabbits showed good agreement. The analysis indicates that the frequency spectrum of the waves and resonance effects in the thorax might have been factors of importance for the production of the lung injuries and, therefore, should be considered when estimating hazards to man from experiments performed with animals. (Author)

A77-14627 **Instrumentation for the rhesus monkey as a cardiovascular analog for man during air-combat maneuvering acceleration.** H. H. Erickson (USAF, School of Aerospace Medicine, Brooks AFB, Tex.) and J. R. Ritzman (U.S. Army, Brooke Army Medical Center, Fort Sam Houston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1153-1158. 24 refs.

The development of high-performance, fighter-attack aircraft has created a need for new techniques and methods to study the effects of acceleration stress on the cardiovascular system. Instrumentation methods were developed in the rhesus monkey (Macaca mulatta), in order to evaluate cardiovascular performance in a high-G, air-combat maneuvering environment. The results indicate that the rhesus monkey is a useful model in studying the effects of gravitoinertial forces encountered by man during repetitive and maneuvering acceleration. The model permits investigation of risk limits, damage mechanisms, fatigue of the cardiovascular system, and pathophysiologic responses to acceleration. Increasing the seat angle during acceleration provides protection to the cardiovascular system and results in improved eye-level blood pressure. Repeated exposure to sustained and maneuvering acceleration indicates that fatigue occurs and that cardiovascular compensation becomes inadequate. (Author)

A77-14628 **Effectiveness of four water-cooled undergarments and a water-cooled cap in reducing heat stress.** G. F. Fonseca (U.S. Army, Military Ergonomics Div., Natick, Mass.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1159-1164. 10 refs.

The cooling provided by four different water-cooled undergarments was directly measured on a heated copper manikin dressed in a basic hot-weather flight ensemble. This cooling, which represents absorption of the heat produced by the metabolic processes of the body plus that from the ambient environment in the cabin, was found to be almost directly proportional to the difference between the manikin skin temperature and the temperature of the cooling water at the inlet to a water-cooled undergarment. Although these cooling garments did not, by themselves, completely isolate the manikin surface against heat gain from the hot environment, they did remove about one-half of the potential for heat gain from the ambient environment before the heat reached the manikin surface. The water-cooled cap removed heat from the manikin equivalent to about one-third of the total metabolic heat production of a seated person. (Author)

A77-14629 **Reaction time and accuracy of the saccadic eye movements of normal subjects in a moving-target task.** R. W. Baloh and V. Honrubia (California, University, Los Angeles, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1165-1167. 16 refs. Research supported by the Deafness Research Foundation; Grant No. PHS-NS-09823.

Reaction time and accuracy of saccadic eye movements in following a target which moved horizontally and in a step-wise fashion were quantitatively assessed in 32 normal subjects using a laboratory digital computer. At 95% confidence intervals, mean saccade reaction time and accuracy were 142 to 230 ms and 76 to 100% respectively. In any single subject reaction time and accuracy were highly symmetrical. There was no significant correlation between saccade amplitude and either reaction time or accuracy. (Author)

A77-14630 **Simple reaction time during exercise, heat exposure, and heat acclimation.** E. Shvartz, A. Meroz, A. Mechtinger, and H. Birnfeld (Tel Aviv University, Sheba Medical Center, Tel Aviv, Israel). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1168-1170. 8 refs.

Simple reaction time (RT) to a visual stimulus was recorded in six young men for 10 successive days. On the first day, RT was recorded at rest and during 2 h of bench-stepping at a load of 39 W at room temperature of 23 C. On the next 8 d, the same measurements were repeated during exercise in heat (40 C DB, 30 C WB), and on the tenth day they were again performed at 23 C. As compared with the resting position, exercise RT increased about 30% during exercise in both the temperate and hot environments on Days 1 and 2 in an unacclimated condition, despite the large increase in rectal temperature in heat. Heat acclimation resulted in the usual decreases in heart rate and rectal temperature and in a decrease in RT. On Day 10 at 23 C, exercise RT did not differ from resting RT. The results show that exercise adversely affects simple RT, which is probably more related to the vibration experienced during exercise than to the increase in body temperature. (Author)

A77-14631 **Heart biochemical responses 14 days after +Gz acceleration.** R. T. Dowell, L. A. Sordahl, J. N. Lindsey, and H. L.

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Stone (Texas, University, Galveston, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1171-1173. 19 refs. Grant No. AF-AFOSR-74-2622.

Myocardial biochemical responses were measured in miniature swine following +Gz stress. Unanesthetized animals were subjected to an acceleration profile encompassing 3, 5, 7, 9, and 11 +Gz. Acceleration exposure time at each G level varied from 60-120 s. At 14 d after +Gz exposure, free lysosomal enzyme activity was reduced by 15-40% in both the epicardial and endocardial portions of the left ventricle while sequestered enzyme activity remained near control levels. Since free lysosomal enzyme activity was previously found to be elevated approximately two-fold in response to a single 9 +Gz exposure, the responses observed 14 d after +Gz acceleration would be consistent with a myocardial damage-repair phenomenon. The DNA levels in the left ventricle of +Gz stressed animals were significantly lower than control values, while the RNA/DNA ratio was markedly elevated. (Author)

A77-14632 * **Survivorship and life expectancy of Drosophila melanogaster populations in abnormal oxygen-normal pressure regimes.** G. Kloek, G. Ridgel, and D. Ralin (Kentucky State University, Frankfort, Ky.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1174-1176. 6 refs. Grant No. NsG-10-00801.

A77-14633 **Facility and a method for evaluation of thermal protection.** A. M. Stoll, L. R. Munroe, M. A. Chianta, J. R. Piergallini, and D. E. Zaccaria (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1177-1181. 17 refs.

The rationale, construction, operation, and protection assessment methodology of the Naval Air Development Center Fuel Fire Test Facility is described. The background and developmental progress to date are discussed. It is shown that the main difficulties associated with full-scale evaluation of fire-protective clothing have been identified and largely surmounted for present practical purposes. Evaluation can now be made reliably with a reasonably small number of prototypes. Modifications in apparatus and method can be made to provide for other studies. Future effort should be directed toward engineering development of scalar models on the one hand and, on the other, basic research into the depth of burns associated with thermal exposures to radiation and to flame contact: engineering effort on scalar modeling may greatly reduce the time and cost of obtaining valid burn protection assessments. (Author)

A77-14634 **Optimization of crew effectiveness in future cockpit design - Biomedical implications.** S. J. Gerathewohl (FAA, Office of Aviation Medicine, Washington, D.C.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1182-1187. 15 refs.

Compatibility of the human operator and automatic cockpit systems, system components, design problems, new considerations in the selection and training of fighter aircraft personnel, and pilot work underloading in an automatic cockpit setting are discussed. Revisions of psychomotor and cognitive testing, possible preference for cerebrotonic response over musculotonic response in pilots, and the suitability of some pilot candidates, rejected in earlier tests, for automated cockpit performance, are dealt with. Psychological problems involving monotony, anomie, and abrupt transition from underactivity to heightened tension and immediate decision making but without the kinetic activity typical of pre-automation cockpit behavior are discussed. Some accident scenarios reconstructed from Flight Data Recorder records illustrating the importance of data display compatible with immediate pilot responses in stressed situations are cited. R.D.V.

A77-14635 **Evaluation of a face cooling device integrated with the standard HGU-type USAF flight helmet.** A. T. Kissen, M. Alexander, D. C. Smedley, W. J. Buehring, S. L. Ward, and D. H. Lowe (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1188-1192. USAF-sponsored research.

The effectiveness of face cooling in ameliorating the physiological impact of a moderate-to-severe, operationally realistic, hyperthermic stress was demonstrated in a previous paper. Justification of the principle prompted efforts to develop a cooling device of improved design which, aesthetically and operationally, interfaced with the HGU-26/P standard Air Force helmet. A single-piece, fiberglass partition was form-fitted to and mounted on the shell with sufficient elevation to provide an air plenum between the two. Ventilating air of 23 C at 0.17 cu m/min (6 cfm) entered the plenum from the side and exited over the anterior edge of the shell. Tracking performance was unchanged with face cooling; however, significant reduction in physiologic strain was demonstrated. Elevations of rectal temperature and heart rate were suppressed by 46% and 45%, respectively. Sweat loss was reduced by 43%. Structural modifications of the helmet to accommodate the device are minimal. (Author)

A77-14636 **Arousing environmental stresses can improve performance, whatever people say.** E. C. Poulton (Medical Research Council, Applied Psychology Unit, Cambridge, England). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1193-1204. 81 refs. Research supported by the Medical Research Council of England.

Contributions of some levels of heat, noise, vibration, and general stress to improve performance, despite results of tests indicating that these discomforting factors degrade efficiency and performance whenever present at whatever level, are discussed. Measures taken to avoid bias in subjective assessments are described. Some cases of discrepancies between actual performance and subjective assessments of performance reflecting discomfort factors known to the subject are cited. Evidence of improved performance accompanying increased discomfort (within limits) is cited. Bias built into experiments, whether instrumented or requiring subjective ratings by subjects, are cited. Experiments reported in the literature are analyzed extensively, and ways of eliminating bias are suggested. R.D.V.

A77-14637 * **Denitrogenation interruptions with air.** J. P. Cooke (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1205-1209. 31 refs. NASA Order T-82170.

A 3-h denitrogenation period at ground-level pressure with 95% O2-5% N2, with an air interruption of 5 min or more and matched with additional denitrogenation time equal to the interruption, will later result occasionally in altitude decompression sickness ('bends') during a 2-h decompression exposure at 3.8 psia (10,058 m equivalent) with 92% O2- 8% N2. Thus the equal time or 'mirror-image' make-up time for loss of denitrogenation did not prevent bends 7 times in 17 subjects during 71 exposures with air interruptions; on the other hand, no case of bends was reported after uninterrupted denitrogenation periods. Nitrogen-loading during the interruptive period is believed to resupply the bends sites with additional nitrogen, which re-establishes conditions favoring a return to a high incidence of bends. (Author)

A77-14638 * **Airborne testing of three antimotion sickness preparations.** W. H. Johnson (Toronto, University, Toronto, Canada),

K. E. Money (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada), and A. Graybiel (U.S. Naval Aerospace Medical Research Laboratories, Pensacola, Fla.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1214-1216. 18 refs, Grant No. NsG-7079.

Thirteen human volunteers were exposed to weekly flights in which standardized, steep turns were used to produce motion sickness. A combination of promethazine hydrochloride (25 mg) plus ephedrine sulphate (25 mg) was found to be equally as effective as the combination of 1-scopolamine hydrobromide (0.35 mg) plus d-amphetamine sulphate (5 mg). Droperidol (2.5 mg) was indistinguishable from the placebo. It was concluded that the treatment of choice for motion sickness is promethazine plus ephedrine. (Author)

A77-14639 **Acquired bundle branch block and its response to exercise testing in asymptomatic aircrewmen - A review with case reports.** J. E. Whinnery and V. Froelicher, Jr. (USAF, Wilford Hall Medical Center, Lackland AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1217-1225. 88 refs.

Performing serial electrocardiograms on apparently healthy populations will detect individuals with serious electrocardiographic abnormalities. The importance of this screening technique is emphasized by the fact that almost one-half the myocardial infarctions that occur are silent. These electrocardiographic abnormalities may be the first sign of other types of diseases as well. However, the sensitivity and specificity of this screening technique has yet to be established by adequate followup studies. Bundle branch block can be the first sign of heart disease in asymptomatic men, but it usually is not associated with sudden incapacitation. Individuals with bundle branch block should have heart disease ruled out by a thorough cardiovascular evaluation, including cardiac catheterization if necessary. Exercise testing is an excellent screening technique for CAD. It has an approximate sensitivity and specificity of 60% and 90%, respectively. Exercise testing does not appear to have any value in screening individuals with left bundle branch block for CAD, but may be helpful in individuals with right bundle branch block. (Author)

A77-14640 **Behavioral control as a tool in evaluating the functional state of cosmonauts in flight.** O. G. Gazenko, V. I. Miasnikov, and F. N. Uskov (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine*, vol. 47, Nov. 1976, p. 1226, 1227. 5 refs.

The present paper deals with an important problem of space medicine - control of the health of cosmonauts in flight based on their behavior. The paper discusses communication in space-time dialogue as the most promising method from the diagnostic point of view. Using a flight of the Soyuz spacecraft by way of illustration, the diagnostic importance of spatial-time characteristics of the dialogue is shown. (Author)

A77-14679 # **Perspectives of using decompression of the lower half of the body in the practice of aviation physical examination (Perspektivy ispol'zovaniia dekompressii nizhnei poloviny tela v praktike vrachebno-letnoi ekspertizy).** P. M. Suvorov. *Voenno-Meditsinskii Zhurnal*, Sept. 1976, p. 63-67. 7 refs. In Russian.

The difference in barometric pressure produced by decompression of the lower half of the human body (DLHB) promotes the storage of blood in the lower part of the body, limits the venous return of that blood to the heart, and reduces the volume of actively circulating blood. Results are presented for a DLHB study on 3 groups of pilot trainees with an average age of 25 yr (26 healthy subjects, 99 subjects with syncopic condition in their medical history, and 25 subjects with vaso-autonomic disturbances). Attention is focused on elucidation of major causes of decreased decompression tolerance in persons with syncopic condition, determination of the influence of age and time elapsed from the moment of syncope, and evaluation of the diagnostic value of DLHB functional testing in the practice of aviation physical examination. It is concluded that DLHB functional testing is suitable for diagnosis of the propensity of the human organism to syncope and vaso-autonomic instability, and that its relative simplicity and safety of application make it recommendable for extensive use in the practice of aviation physical examination. S.D.

A77-14747 * **Effects of water immersion on renal hemodynamics in normal man.** M. Epstein, R. Levinson, and R. Loutzenhiser (U.S. Veterans Administration Hospital; Miami, University, Miami, Fla.). *Journal of Applied Physiology*, vol. 41, Aug. 1976, p. 230-233. 23 refs. Research supported by the U.S. Veterans Administration; Grants No. NGR-10-007-097; No. NIH-RR-261.

The present study was undertaken to delineate the effects of water immersion to the neck (NI) on renal plasma flow and glomerular filtration rate as assessed by the clearance of p-aminohippuric acid (PAH) and inulin, respectively. Nine normal male subjects were studied on two occasions, control and NI. The conditions of seated posture and time of day were identical. Immersion did not alter either clearance at a time when sodium excretion was increasing markedly. The constancy of PAH clearance during NI suggests that renal blood flow is unaltered and that the natriuresis of NI is mediated independently of alterations in overall renal perfusion. The sluggish decline of a natriuresis during recovery is consistent with the presence of a humoral factor contributing to the encountered natriuresis. (Author)

A77-14801 # **Some problems of space medicine (Nekotorye problemy kosmicheskoi meditsiny).** N. N. Gurovskii and A. D. Egorov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, no. 6, 1976, p. 3-14. 29 refs. In Russian.

The paper is concerned with a number of problems being solved by space medicine along with its major development stages. Particular attention is given to a discussion of the symptom complex that is superficially similar to motion sickness, changes in motor function during flight, cardiovascular changes during prolonged spaceflight, changes in water-electrolyte balance, calcium depletion in the bony tissue, as well as the anemia syndrome and changes in the immunologic susceptibility of the organism. Basic phases of human adaptation to weightlessness are identified, along with the mechanisms governing the behavior of physiologic functions in these conditions. Future trends of space medicine problems are pointed out. S.D.

A77-14802 # **The cardiovascular system during hypokinesia of varying duration and intensity (Serdechno-sosudistaia sistema pri gipokinezii razlichnoi dlitel'nosti i vyrazhennosti).** N. E. Panferova. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina*, vol. 10, no. 6, 1976, p. 15-20. 15 refs. In Russian.

The paper gives and compares data on the orthostatic tolerance of man exposed to different hypothetic conditions of varying duration - water immersion (10 days), supine position in the chair close to the mean physiological rest posture (7-20 days), bed rest (10-120 days) and altitude chambers (3-70 days). The tolerance to orthostatic tests decreased to a larger extent after experiments in which the motor activity was significantly lowered: water immersion, supine position in the chair and 120-day bed rest: orthostatic tolerance reduced to a lesser extent after altitude chamber experiments. The level of decline of the motor activity was more important than the time of hypokinetic exposure. The most noticeable

reduction of adaptive capabilities of the cardiovascular system developed during the first 30 days of bed rest. (Author)

A77-14803 # **Hypokinetic tolerance of persons adapted to high altitudes (Perenosimost' gipokinezii liu'mi, adaptirovannymi k vysokogor'iu).** V. I. Korol'kov and M. M. Mirrakhimov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 20-24. 23 refs. In Russian.

After a 26-day exposure to an altitude of 3200 m test subjects were kept in bed for 10 and 24 days. Each experimental group consisted of 6 test subjects. Physiological effects of the exposure were measured with respect to changes in the respiration, circulation and red blood systems as well as in the orthostatic and exercise tolerance. High altitude adaptation which preceded bed rest did not arrest the development of orthostatic intolerance or the decrease of physical performance that resulted from the bed rest experiment. (Author)

A77-14804 # **Effect of prolonged hypokinesis on the PO2 dynamics in the rat brain tissues during orthostatic and antiorthostatic tests (Vliianie dlitel'noi gipokinezii na dinamiku PO2 v tkaniakh golovnogo mozga krys pri ortostaticheskoi i antiortostaticheskoi probakh).** E. A. Kovalenko and A. V. Riazhskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 24-27. In Russian.

A77-14805 # **Effect of orthostatic and antiorthostatic hypokinesia on taste sensitivity in men (Vliianie ortostaticheskoi i antiortostaticheskoi gipokinezii na vkusovuiu chuvstvitel'nost' cheloveka).** S. M. Budylina, V. A. Khvatova, and A. I. Volozhin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 27-30. 12 refs. In Russian.

Orthostatic (+6 deg) and antiorthostatic (-2 deg) 30-day bed rest resulted in reduced taste sensitivity to nutritional stimuli, elevated mobilization of taste receptors of the tongue and decreased amplitude of the gastrolingual reflex. An exposure to the antiorthostatic position at a greater angle (-6 deg) yielded opposite changes in the thresholds of taste sensitivity, phasic changes in the mobilization of taste receptors and decreased amplitude of the gastrolingual reflex. During the recovery period, taste sensitivity rapidly returned to the normal. (Author)

A77-14806 # **Changes in the central and peripheral circulation and acid-base balance of blood in dogs during tilt tests (Izmeneniia tsentral'nogo i periphericheskogo krovoobrashcheniia i kislotno-shchelochnogo ravnovesiia krovi u sobak vo vremia passivnoi ortostaticheskoi proby).** V. E. Katkov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 31-36. 61 refs. In Russian.

Integral changes in circulation and acid-base equilibrium of blood were studied on urethane-chloralose anesthesized dogs during a 20 min tilt test. Against the background of a relatively stable mean pressure in the aorta, the blood flow in the aorta and carotid artery diminished, pressure in the right atrium decreased and the heart rate increased. The phase of isometric contraction of the left ventricle increased, ejection time, mechanical systole and intrasystolic index decreased whereas the myocardial contractility increased. The blood flow in the liver, spleen and hind limb skin reduced and in hind limb muscles remained unaltered. In the arterial blood metabolic acidosis and hyperventilation developed. (Author)

A77-14807 # **Effect of muscle electrostimulation treatment on orthostatic tolerance in man (Vliianie kursa elektrotimuliatsii myshts na ortostaticheskuiu ustoichivost' cheloveka).** V. M. Mikhailov and V. S. Georgievskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 37-41. 29 refs. In Russian.

Two series of experiments were conducted on six and twelve (3 groups of 4 persons each) healthy subjects in ambulatory and bed-ridden conditions, respectively, to assess the effect of electrostimulation on their orthostatic tolerance. The first series of experiments consisted of a 30-day (5 times a week, 25-30 min daily) electrostimulation treatment for the muscle groups of the calfs, thighs, back, and abdomen. The second series of experiments consisted of 45-day (6 times a week, twice a day for 30 min) electrostimulation treatment given to the subjects in a bed-ridden orthostatic position with two different procedures for two of the three groups, the third group serving as the control. Heart rate and blood pressure results were submitted to statistical treatment. It is found that muscle electrostimulation had a beneficial effect on orthostatic tolerance in the ambulatory subjects. In the bed-ridden subjects, 20-electrode electrostimulation gave better results than 12-electrode electrostimulation. The third group of subjects, who were not electrostimulated during hypokinesia, showed a pronounced reduction in orthostatic tolerance. S.D.

A77-14808 # **Functional state of the acoustic analyzer in man exposed to +Gx (Funktsional'noe sostoianie zvukovogo analizatora cheloveka pri uskorenii +Gx).** A. S. Barer and V. E. Grishanov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 41-47. 23 refs. In Russian.

The functional state of the human acoustic analyzer was investigated during an exposure to +Gx acceleration of 4-14 g applied at an angle of 78 deg to the longitudinal axis of the body. During an exposure to 8-10 g the hearing state began to deteriorate. This included an increase in the tonal thresholds of hearing sensitivity with respect to the aerial and bone conduction, and an increase in the differential thresholds of hearing with respect to intensity and pitch. With an increase in the acceleration value, these changes grew, reaching a maximum at 14 g. It is suggested that possible mechanisms of changes in the hearing sensitivity are associated with disorders in the systems of sound conduction and perception. (Author)

A77-14809 # **Dependence of the biological effect of radiation on the area of irradiated body surface (Zavisimost' biologicheskogo etfekta radiatsii ot ploshchadi obluchennoi poverkhnosti tela).** G. F. Nevskaia, E. V. Ginsburg, V. S. Grammatikati, G. P. Efremov, V. T. Kruglov, Iu. I. Kudriashov, and V. G. Khrushchev. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 47-51. 12 refs. In Russian.

Results are presented of an experimental study in which skin portions of different areas in piglets were exposed to soft X-rays. The biological effect of radiation was evaluated in terms of clinical, hematological, and biochemical changes in the animal's body. The data obtained point to the development of burn illness whose severity increased with an increase in the area of irradiated skin surface. S.D.

A77-14810 # **Clinical course of radiation damage at high altitudes (Klinicheskoe techenie radiatsionnogo porazheniia v usloviiakh vysokogor'ia).** Iu. G. Grigor'ev, S. B. Daniiarov, M. M. Mirrakhimov, Iu. V. Farber, M. P. Kalandarova, B. U. Moldotashev, G. N. Prizhivoit, and A. V. Shafirkin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 51-54. 6 refs. In Russian.

Experiments were carried out on dogs at an altitude of 3200 m above sea level to evaluate the effect of high altitudes on the course of radiation sickness in animals exposed to gamma radiation. Clinical

observations, morphological examination of blood and bone marrow, and measurements of blood coagulation parameters were made at different time intervals. It is found that radiation of animals after a preliminary 25-day high-altitude acclimatization and further stay at a high altitude results in alleviating the severity of radiation sickness. The clinical course of radiation sickness aggravated in dogs who were re-acclimatized to high altitude following radiation exposure. It is suggested that dogs maintained at high altitudes before and after radiation exposure exhibit a more intense recovery, especially in erythropoiesis. These animals also showed steady decrease in blood clotting rate and prolonged maintenance of high activity for the fibrinolytic system. S.D.

A77-14811 # **Significance of the nonverbal characteristics of a speech signal in evaluating the psychophysical state of a pilot (Znachenie neverbal'nykh kharakteristik rechevogo signala dlia otsenki psikhicheskogo i fizicheskogo sostoianiia letchika).** I. Schultz. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 54-58. 18 refs. In Russian.

Results are presented for an experimental study designed to compare the objective characteristics of the speech signal of pilots and operators exposed to real extremal psychological stress with the voice characteristics of persons subjected to different kinds of stressors simulating various types of flying operations in the laboratory. Analysis of the frequency, time, and dynamics characteristics of the acoustic signal is one of the useful and reliable methods for an objective assessment of the psychophysical state of a pilot. It is shown that the human voice alters most seriously in response to psychological stressors and factors that affect the normal mechanics of respiration as related to breathing under increased pressure and under acceleration. The voice remains unchanged during exposure to hypoxia and high ambient temperatures. S.D.

A77-14812 # **Excretion dynamics and composition of human wastes as derived from one-year experimental results (Dinamika vydeleniia i sostav nekotorykh produktov zhiznedeiatel'nosti cheloveka po rezul'tatam godichnogo eksperimenta).** Iu. G. Nefedov, A. N. Kochetkova, V. N. Sokolov, and V. G. Vysotskii. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 58-62. 17 refs. In Russian.

The one-year experiment in which three test subjects participated provided data on the rate and frequency of excretion of urine and feces, their composition and amount. The results obtained should be taken into consideration when designing and manufacturing human waste systems for space cabins. (Author)

A77-14813 # **Dependence of blood carboxyhemoglobin level and expired carbon monoxide content in testees upon the CO concentration in the sealed-chamber atmosphere (Zavisimost' soderzhaniia karboksigemoglobina v krovi i okisi ugleroda v vydykhaemom vozduke ispytatelei ot konisentratsii CO v vozdukhe germokamery).** V. P. Savina, N. L. Sokolov, and E. I. Nikitin. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 62-66. 11 refs. In Russian.

A77-14814 # **Evaluation of the quality of reclaimed water on the basis of total organic carbon content (Otsenka kachestva regenerirovannoi vody po obshchemu organicheskomu uglerodu).** V. M. Skuratov, V. B. Gaidadymov, and S. V. Chizhov. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 66-70. 14 refs. In Russian.

Utilization of water supply recovery systems requires an operative monitoring of the quality of reclaimed water in space missions, which should be evaluated with a minimum number of parameters to ensure its physiological acceptability. The paper examines the suitability of measuring the total content of organic carbon as an effective tool for estimating the quality of reclaimed water. Data are presented on total organic carbon content, ratio of chemical consumption of oxygen and carbon in atmospheric condensate, in urine condensate from low-temperature urine evaporation, and in potable water reclaimed from these sources by a sorption technique. S.D.

A77-14815 # **Investigating the possibility of using the transpiration moisture condensate of sweet potato for plant cultivation in biological life support systems (Issledovanie vozmozhnosti ispol'zovaniia kondensata transpiratsionnoi vlagi batata dlia vyrashchivaniia rastenii v biologicheskikh sistemakh zhizneobespecheniia).** T. A. Derendiaeva. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 70-73. 8 refs. In Russian.

A77-14816 # **Hygiene evaluation of experimental samples of the antimicrobial underclothing containing hexachlorophene (Gigienicheskaia otsenka eksperimental'nykh obraztsov antimikrobnogo bel'ia, soderzhashchego geksakhlorofen).** V. V. Borshchenko, F. K. Savinich, V. P. Gorshkov, and A. P. Rogatovskaia. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 73-76. 7 refs. In Russian.

The hygienic examination of 12 samples of knitted underclothing which contained hexachlorophene added during fiber formation allowed the selection of four types that can be used under poor sanitary conditions. Considering possible changes in the proportion of various microorganisms during prolonged space flights, it is recommended that extensive investigation be carried out in order to demonstrate the subability of antimicrobial underclothing in space missions. (Author)

A77-14817 # **Investigation of the characteristics of a seismocardiographic transducer (Issledovanie kharakteristik seismokardiograficheskogo datchika).** D. G. Maksimov, S. G. Odintsov, and G. I. Kheimets. *Kosmicheskaia Biologiia i Aviakosmicheskaia Meditsina,* vol. 10, no. 6, 1976, p. 76-78. 5 refs. In Russian.

Six inductive seismocardiographic transducers were tested on a vibration rig to determine their amplitude-frequency response and to evaluate their effect on the thoracic cage surface oscillation with a view toward reducing the errors in assessing the contractile function of the heart. The measurement results were used to construct the mechanical equivalent diagram for the transfer of vibrations at the transducer/body surface interface, with allowance for the transducer weight. It is found that the resonant frequency of the transducer is 25 Hz, which lies within the working range for the frequency of precordial vibrations of low and ultralow frequency (0-50 Hz). The amplitude of the transducer's output signal is found to depend on its spatial orientation. Distortions caused by transducer weight can be eliminated by using a transducer that is 10 grams lighter with a sufficiently firm pressure on the thoracic cage without deforming it. One way of reducing the nonuniformity of the amplitude-frequency response of a seismocardiographic transducer is to increase damping through increased viscosity of the damping fluid. S.D.

A77-14866 # **Two-dimensional linear models of biped walking (Ploskie lineinye modeli dvunogoi khod'by).** V. V. Beletskii and T. S. Kirsanova. *Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela,* July-Aug. 1976, p. 51-62. 5 refs. In Russian.

An analytical two-dimensional model is constructed for the motion of a biped walking machine consisting of a balancing upper part and two legs. The rhythmic (periodic) motions of the machine

are examined along with the kinematics of leg transfer. Equations of motion are solved in an explicitly analytical form, assuming the machine to be making small two-dimensional oscillations. Three different walking styles: complete, symmetrically human, and nonsymmetrically human are analyzed and compared energetically. B.J.

A77-14903 # **Estimate of capillary vessel performance during acceleration (Ocena zachowania sie naczyn wlosowatych podczas dzialania przyspieszen).** J. Domaszuk and M. Wojtkowiak (Wojskowy Instytut Medycyny Lotniczej, Warsaw, Poland). *Postepy Astronautyki*, vol. 9, no. 3, 1976, p. 73-80. 10 refs. In Polish.

The vascular system of rats subjected to +Gz acceleration forces in a centrifuge was investigated. Albumin microspheres 20-50 microns in diameter labelled with I-131 isotope were injected intravenously before the centrifuge tests. Scintigrams revealed that the +Gz acceleration forces result in a progressive dilation of capillaries in the lower parts of the body. Under extremal values of acceleration the diameter of dilated capillaries exceeds 50 microns. However, +Gz accelerations do not cause capillary expansion in the pulmonary circulation. P.T.H

A77-14958 **Physical activity and coronary heart disease; Proceedings of the Third Paavo Nurmi Symposium, Helsinki, Finland, September 18-20, 1975.** Symposium sponsored by the Paavo Nurmi Foundation. Edited by V. Manninen and P. I. Halonen. Basel, S. Karger AG (Advances in Cardiology. Volume 18), 1976. 280 p. $46.25.

Aspects of hypertrophy, hyperplasia, and structural dilatation of the human heart are considered along with the effects of physical training and detraining on intrinsic cardiac control mechanisms, the effect of acute ischemia on cyclic AMP levels and other parameters in the cytosol and in mitochondria of hypertrophied and nonhypertrophied hearts, the collagen metabolism of the rat heart during experimental cardiac hypertrophy and the effect of digitoxin treatment, and protein metabolism in the work-overloaded myocardium. Attention is given to factors controlling protein synthesis in heart muscle, the effect of complete and partial deconditioning on exercise-induced cardiovascular changes in the rat, physical activity and coronary collateral development, and occupational physical activity and coronary artery disease. G.R.

A77-15203 **Models to aid user measurement of a computer network.** D. E. Morgan and R. C. Kolanko (Waterloo, University, Waterloo, Ontario, Canada). In: National Telecommunications Conference, New Orleans, La., December 1-3, 1975, Conference Record. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 44-1 to 44-5. 10 refs.

A computer system model is described which aids monitoring, evaluating, and understanding the behavior of computer systems and networks from a user's viewpoint. The approach defines a real man-computer system in terms of layers of abstract machines, determines the measures needed in terms of these machines, makes the measurements on the real system, and then interprets them in terms of the abstract machines. A model instrumentation system based on simple queueing theory is presented, which serves as a basis for the computer network monitoring system used to observe the performance of a simple two-node computer network. The hierarchical approach to measurement allows the user to determine the measurements needed to achieve his goals, along with the tools and techniques necessary to perform the desired measurements. S.D.

A77-15204 **Human perception of telecommunications responsiveness.** T. E. Bell (TRW Systems Group, Redondo Beach, Calif.). In: National Telecommunications Conference, New Orleans, La., December 1-3, 1975, Conference Record. Volume 2. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 44-18 to 44-20. 6 refs.

It is argued from the point of view of informal studies that the analysis of the responsiveness of a computer system must use metrics that are related to responsiveness as humans perceive it. Attention is given to human perception of computer responsiveness in relation to the use of standard metrics (the mode and the mean), metrics of multiple parameters, and objective-directed metrics. Perceived responsiveness is discussed in terms of static vs dynamic metrics. It is concluded that the standard metrics appear inadequate and a different methodology for designing and tuning on-line systems should be adopted. B.J.

A77-15429 **Calibration of a multimode microwave exposure chamber.** E. L. Bronaugh and D. R. Kerns (Southwest Research Institute, San Antonio, Tex.). In: International Symposium on Electromagnetic Compatibility, San Antonio, Tex., October 7-9, 1975, Record. New York, Institute of Electrical and Electronics Engineers, Inc., 1975, p. 5BIIb1-5BIIb5. 8 refs.

The experimental calibration program reported uses calorimetry as the means for measuring the power absorbed by the calibrating material. Deionized water is employed as the calibrating material. An approach is described for obtaining the relationship between the power density of a plane-wave illuminating a parcel of material and the power absorbed by the parcel. Attention is given to aspects of power absorption in a chamber, the characteristics of power absorption by materials other than water, the experimental data needed, the plane-wave heating rate, the chamber heating rate, the equivalent plane-wave power density, and the variability of power absorption. G.R.

A77-15490 **Life support system with autonomous control employing plant photosynthesis.** I. I. Gitel'zon, I. A. Terskov, B. G. Kovrov, F. Ia. Sid'ko, G. M. Lisovskii, Iu. N. Okladnikov, V. N. Belianin, I. N. Trubachev, and M. S. Rerberg (Akademiia Nauk SSSR, Institut Fiziki, Krasnoyarsk, USSR). *Acta Astronautica*, vol. 3, Sept.-Oct. 1976, p. 633-650.

The BIOS-3 experimental complex was designed to test the feasibility of a life support system controlled autonomously from within by the inhabitants. The experiment lasted for six months, three men inhabiting the hermetic system simultaneously, and consisted of three stages: (1) the first stage used two equivalent phytotrons (a compartment of higher plants for photosynthesis), consisting of a wheat culture, and an assortment of vegetable plants, (2) the second stage one of the phytotrons was removed while a compartment of chlorella cultivators was introduced, and (3) the third stage used a phytotron which was exclusively an assortment of vegetable cultures. It was shown that an autonomous life control system using photosynthesis is feasible within a small confined space, but that immunological and microbiological research indicates that the medium created by the system is not fully suitable for man. B.J.

A77-15524 **Adaptation to an 8-h shift in living routine by members of a socially isolated community.** D. G. Hughes (Alderhay Hospital, Liverpool, England) and S. Folkard (Medical Research Council, Experimental Psychology Laboratory, Brighton, Sussex, England). *Nature*, vol. 264, Dec. 2, 1976, p. 432-434. 11 refs.

A77-15616 **The cost of categorization in visual search - Incomplete processing of targets and field items.** H. Gleitman (Pennsylvania, University, Philadelphia, Pa.) and J. Jonides (Michigan, University, Ann Arbor, Mich.). *Perception and Psycho-*

physics, vol. 20, no. 4, Oct. 1976, p. 281-288. 24 refs. Research supported by the Spencer Foundation and U.S. Navy; Grant No. NIH-MH-23505.

A partial processing hypothesis is proposed to account for performance under a visual search condition where target and field items belong to the different conceptual categories, letter and digit (between-category search), as compared to a condition in which they belong to the same category (within-category search). This hypothesized mechanism implies that less information is registered and/or retained in between- than in within-category search. This prediction was tested and confirmed in three experiments. The results indicate that both targets and field items are processed less deeply in between- than in within-category search. (Author)

A77-15617 * **Head restraint enhances visual monitoring performance.** J. S. Warm, R. G. Wait (Cincinnati, University, Cincinnati, Ohio), and M. Loeb (Louisville, University, Louisville, Ky.). *Perception and Psychophysics*, vol. 20, no. 4, Oct. 1976, p. 299-304. 22 refs. Grant No. NGL-36-004-014.

Subjects monitored a visual display for occasional increments in the horizontal movement of a bar of light. When the display was viewed without head restraint, detection probability was directly related to the amplitude of the increments in movement which constituted critical signals and inversely related to background event rate (the frequency of neutral events in which critical signals were embedded). When positioning of the head was restrained by a headrest, the detectability of low-amplitude signals was enhanced considerably and the influence of background event rate was attenuated. The results are considered as providing further support for the importance of sense mode coupling in visual monitoring. (Author)

A77-15808 **Negative aftereffects in visual perception.** O. E. Favreau (Montréal, Université, Montreal, Canada) and M. C. Corballis (McGill University, Montreal, Canada). *Scientific American*, vol. 235, Dec. 1976, p. 42-48. 5 refs.

It is found that, after looking at a bright light, a dark image of the object remains in the visual field for some time afterward. The phenomenon is called a negative afterimage. Attempts to understand visual aftereffects are discussed, taking into account investigations conducted by Plateau, the concept of normalization proposed by Gibson, the tilt aftereffect, general aspects of the neurophysiology of the visual system, and studies regarding the properties of neurons in the visual cortex of the cat brain. It appears that afterimages depend on the fatigue of cells in the early stages of visual processing. Figural and motion aftereffects appear to depend on properties of neurons at a higher level, perhaps in the visual cortex. G.R.

A77-16052 **Photokeratography using moiré techniques.** M. Chander, M. M. Bindal, A. Kulshreshtha, and B. K. Agarwala (National Physical Laboratory of India, New Delhi, India). *Applied Optics*, vol. 15, Dec. 1976, p. 2964, 2965. 12 refs.

The new technique for determining the corneal topography of the human eye described is a modification of the normal moiré technique (known as the oblique shadow method) for this purpose. The specific features of the modification are explained on the basis of a schematic of the experimental setup. Results obtained by the technique are presented. One is the modulated image of the grating, on the corneal surface; obtained with single exposure, it shows how the grating lines are modulated over the corneal surface. Another result is a moiré contour photograph of the cornea; the moiré pattern was obtained by double exposure, superposing the unmodulated image of the grating over the reflected corneal image. V.P.

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STAR ENTRIES

N77-12666 Virginia Commonwealth Univ., Richmond.
TOPOLOGY IN BIOLOGY, THE RELATIONSHIP OF STRUCTURE TO FUNCTION Ph.D. Thesis
Wayne Arthur Wiegand 1976 153 p
Avail: Univ. Microfilms Order No. 76-23718

The problem of studying these systems is undertaken with the goal of showing that techniques are now available which allows one to consider complex spacial organization in developing models for the study of the dynamics of biological systems. A specific example of the mitochondrial respiratory cycle in a stirred tank is given and this is contrasted to the situation where the outer membrane introduces the aspect of conponent transport. It is indicated that the complex reaction-diffusion systems one sees in single mitochondria as well as in aggregates of mitochondria are capable of multiple steady states and are also capable of establishing ion gradients as required for filtration in the proximal tubulars. Multiple steady states also allow for a switching process that can turn chemical reaction systems on and off. The techniques presented strongly suggest that many complex processes involving reaction-diffusion systems will exhibit multiple steady states and as such cannot be modeled by previous techniques which do not consider the structure.
Dissert. Abstr.

N77-12667# Armed Forces Radiobiology Research Inst., Bethesda, Md.
MICROWAVE EXPOSURE FACILITY: MULTIPLE ANIMAL EXPOSURE AT EQUAL POWER DENSITY
S. A. Oliva and G. N. Catravas Apr. 1976 24 p refs
(DNA Proj. NWED-QAXMC912)
(AD-A024939; AFRRI-SR76-12) Avail: NTIS HC A02/MF A01 CSCL 14/2

A microwave irradiation facility for multiple animals is described. A feature of the facility is that the natural radiation characteristics of the microwave field are utilized to ensure that each animal in the array receives an equal exposure. Also, the animals are separated sufficiently to ensure minimum interations between animals due to microwave reflections. Cages of sufficient microwave transparency to minimize microwave reflections are incorporated in the facility. Overall, the facility provides equal exposure to all animals to within + or - 15 percent.
Author (GRA)

N77-12668# Illinois Univ., Chicago. Dept. of Biological Sciences.
METABOLIC RATES IN FIVE ANIMAL POPULATIONS AFTER LONG-TERM EXPOSURE TO SANGUINE/SEAFARER ELF ELECTROMAGNETIC FIELDS IN NATURE
Bernard Greenberg Apr. 1976 35 p refs
(Contract N00039-73-C-0030)
(AD-A024955) Avail: NTIS HC A03/MF A01 CSCL 06/18

Five species of animals dwelling in or on the soil were collected under the U. S. Navy's Extremely Low Frequency (ELF) antennas at the Wisconsin Test Facility during summer 1975, and tested for oxygen consumption and respiratory quotients (R. Q.). The animals collected include the redbacked salamander, the woodlouse, the slug, the earthworm and the redworm. No significant differences in either oxygen consumption or R. Q. were found. Analyses of metabolic rates employing past data were also performed and showed no seasonally linked change in sensitivity to the electromagnetic fields. Finally, short term (one week) exposure of earthworms to the electromagnetic fields did not alter metabolic rates, but confinement in nylon bags and translocation did, thereby limiting meaningful conclusions.
Author (GRA)

N77-12669 West Virginia Univ., Morgantown.
THE COLLECTION, ANALYSIS, AND COMPARISON OF HUMAN SENSIBLE PERSPIRATION BETWEEN SEDENTARY AND CONDITIONED MALE CAUCASIANS AS TO THE VARIATION IN SELECTED ELECTROLYTE COMPOSITION Ph.D. Thesis
Robert Edward Moore 1976 149 p
Avail: Univ. Microfilms Order No. 76-22439

The specific task was to collect, analyze, and compare human sensible perspiration (eccrine sweat) between sedentary and conditioned male caucasians as to the variation in selected electrolyte concentrations - sodium, chloride, potassium, calcium, and magnesium. It was concluded from the investigation that the sedentary and conditioned groups differed significantly only in the quantity of calcium and magnesium secreted in sweat. These differences showed that the sedentary group secreted the larger quantity of these two electrolytes.
Dissert. Abstr.

N77-12671# Defence Research Board, Ottawa (Ontario). Dept. of Physiology.
DRB AVIATION MEDICAL RESEARCH UNIT REPORTS. VOLUME 5: 1974 - 1976
G. Melvill Jones, comp. and G. Mandl, comp. Sep. 1976 294 p refs
(DRB-DR-225) Avail: NTIS HC A13/MF A01

Reflex movements of the eye are discussed in relation to vestibular contribution to orientation in adverse environments of flight and space.

N77-12672# Defence Research Board, Ottawa (Ontario).
NEUROPHYSIOLOGY AND ROAD SAFETY: CONTRIBUTION OF THE FRONTAL LOBES TO VISUAL ORIENTING
D. Guitton and G. Mandl *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 1-9 refs

Avail: NTIS HC A13/MF A01

The functional role of the frontal lobe is described as a major importance in visual orientation. The neural processes and frontal lobe disorders are studied showing their effects on visuo-motor coordination.
M.C.F.

N77-12673# Defence Research Board, Ottawa (Ontario).
COLOR INPUTS TO ORIENTATION DETECTORS IN THE HUMAN VISUAL SYSTEM
C. R. Sharpe and G. Mandl *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 69-84 refs

Avail: NTIS HC A13/MF A01

The interaction of spatial and chromatic (red and blue) channels in the human visual system is described. Results from psychophysical experiments have shown that superimposing a low luminance uniform background of one color upon a sinusoidal grating (4c/deg) of another color has no effect upon a subject's contrast threshold for that grating. This lack of contrast dilution was taken to indicate that, at low background luminance, the spatial pattern detectors responsible for detecting the grating were color specific. Cross-color spatial adaptation is orientation specific. The orientation selectivities of same color and cross-color

adaptation were compared by the equivalent contrast transformation. When testing red gratings, the tuning curves were broader for cross-color (adapt blue; test red) than for same-color (adapt red; test red) adaptation. The converse was true for testing blue gratings. As the experiments were so arranged that cross-color adaptation could not have been the result of direct test channel excitation, it is suggested that such adaptation may be the after effect of prolonged inhibition between orientation specific spatial pattern detectors. Author

N77-12674# Defence Research Board, Ottawa (Ontario).
THE VESTIBULAR SYSTEM FOR EYE MOVEMENT CONTROL
G. Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 85-101 refs

Avail: NTIS HC A13/MF A01

Inputs to the oculo-motor system are discussed using rotational and linear accelerative stimuli. Eye movements relative to head positions are discussed. M.C.F.

N77-12675# Defence Research Board, Ottawa (Ontario).
PLASTICITY IN THE ADULT VESTIBULO-OCULAR REFLEX ARC
G. Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 102-123 refs

Reflex movements of the eye are discussed in relation to vestibular contribution to orientation in adverse environments of flight and space.

N77-12676# Defence Research Board, Ottawa (Ontario).
AN ADAPTIVE NEURAL MODEL COMPATIBLE WITH PLASTIC CHANGES INDUCED IN THE HUMAN VESTIBULO-OCULAR REFLEX BY PROLONGED OPTICAL REVERSAL OF VISION
P. Davies and G. Melvill Jones *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 124-134 refs

Avail: NTIS HC A13/MF A01

A neural model was formulated to answer questions about changes between the vestibular and oculomotor system and whether these changes are responsible for complex gain phase behavior. It is shown that both excitatory and inhibitory influences can impinge simultaneously on cells in the vestibular nuclei projecting to the oculomotor system. M.C.F.

N77-12677# Defence Research Board, Ottawa (Ontario).
THE RESPONSE TO SOUND OF IDENTIFIED RETICULO-SPINAL CELLS
S. Rossignol *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 135-182 refs

Avail: NTIS HC A13/MF A01

The anatomy and physiology of reticulo-spinal (RS) cells were reported together with a comparison of the pattern of response to sound and other stimuli. Identification of RS cells was done by stimulating the ventral surface of the upper lumbar cord and recording extra-cellularly in the brain stem with large stainless steel microelectrodes. Because RS cells respond to sound and due to their role in locomotion, it was concluded that auditory influences on motor control may be mediated through reticulo-spinal pathways. M.C.F.

N77-12678*# Defence Research Board, Ottawa (Ontario).
SUBJECTIVE DETECTION OF VERTICAL ACCELERATION: A VELOCITY DEPENDENT RESPONSE?
G. Melvill Jones and L. R. Young *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 245-255 refs Sponsored by NASA

Avail: NTIS HC A13/MF A01 CSCL 05E

Difficulty in the subjective tracking of the whole body vertical accelerative movement parallel to the long axis of the body is discussed which identified specifically the direction of imposed acceleration to be the difficulty rather than low sensitivity to vertical acceleration. The product of angular acceleration and time to detect proves to be constant over a wide range of suprathreshold step changes of angular acceleration. It is concluded that threshold conditions are determined by the velocity attained rather than the acceleration amplitude for the semicircular canals. M.C.F.

N77-12679# Defence Research Board, Ottawa (Ontario).
HUMAN SUBJECTIVE AND REFLEX RESPONSES TO SINUSOIDAL VERTICAL ACCELERATION
G. Melvill Jones, R. Rolph, and G. H. Downing *In its* DRB Aviation Med. Res. Unit Rept., Vol. 5 Sep. 1976 p 256-270 refs

Avail: NTIS HC A13/MF A01

Response characteristics are discussed of both subjective sensation and involuntary oculomotor response to a wide range of sinusoidal frequencies of linear acceleration imposed in a vertical direction. Measurements of eye movements were conducted with eyes open behind blackout goggles after at least 45 minutes dark adaptation to ensure minimal changes in electrooculographic gain. The results reveal quite different patterns of subjective and involuntary reflex dependence on the frequency of sinusoidal stimulation. M.C.F.

N77-12680*# Methodist Hospital, Houston, Tex.
AUTOMATED ELECTROENCEPHALOGRAPHY SYSTEM AND ELECTROENCEPHALOGRAPHIC CORRELATES OF SPACE MOTION SICKNESS, PART 2 Final Report
James D. Frost, Jr. 5 Nov. 1976 25 p refs
(Contract NAS9-13870)
(NASA-CR-151106) Avail: NTIS HC A02/MF A01 CSCL 06P

Sleep pattern alterations were detected in two subjects by electroencephalographic, electrographic, and electromyographic monitoring before, during and after a 28 day bed rest. Standardized criteria were used for data analysis. During the second half of the bed-rest period, sleep latency and stage 3 increased, while total sleep time, stage 2, and REM latency decreased. In addition, during bed rest both subjects showed an increase in the number of REM periods and a slight increase in stage REM amount. No major alterations were seen in the recovery period. Of the alterations found to be associated with bed rest, only one, the increase in stage 3 sleep, was also seen consistently during Skylab. Conversely, none of the postflight changes seen following Skylab were observed during the post-bed-rest recovery period. Author

N77-12681# Witwatersrand Univ., Johannesburg (South Africa). School of Mechanical Engineering.
THE BEHAVIOUR OF SKIN TEMPERATURE PROFILES IN THE FOREARM OF A NUDE RESTING SUBJECT AT AIR TEMPERATURES FROM 24 C TO 34 C
A. M. Patterson Jul. 1976 64 p refs
(Rept-69; ISBN-0-85494-396-X) Avail: NTIS HC A04/MF A01

The transient responses of the temperature profiles during a period of four hours after entry into the climatic chamber are presented. The results show that the depth of a surface at which heat is believed to be released within the skin varies systematically with the rate of heat release, and depths of between 0.4 mm and 2.7 mm were observed in this study. A direct, in vivo determination of the thermal conductivity of unperfused skin tissue

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is also made, and the result 0.1 W/m K obtained. The fact that skin surface heat loss is predominantly accounted for by heat convected to the skin by blood is confirmed. Author

N77-12682# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
REVIEW OF RADIOCHEMICAL METHODS FOR PU-239 DETECTION IN ENVIRONMENTAL AND BIOLOGICAL SAMPLES
S. Greco, F. Notargiacomo, and C. Riccobello 15 Oct. 1975 39 p refs In ITALIAN; ENGLISH summary
(ISS-R-75/12) Avail: NTIS HC A03/MF A01

Radiochemical methods for detection and quantitative analysis of Pu-239 low levels in environmental (soil, water) or biological (urine, human wastes, etc.) samples are described. The methods include the ion exchange chromatography and the solvent extraction. The main physico-chemical properties of Pu-239 and its radiotoxic hazards are reviewed. ESA

N77-12683# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
RADIATION EXPOSURE OF THE ITALIAN POPULATION DUE TO MEDICAL DIAGNOSTIC EXAMINATIONS IN 1974
S. Benassi (CNEN, Rome), F. Dobici (CNEN, Rome), P. L. Indovina (Min. della Sanita), E. Prozzo, L. Pugliani, P. Salvadori, and A. Susanna (CNEN, Rome) 20 Oct. 1975 23 p refs Submitted for publication
(ISS-P-75/13) Avail: NTIS HC A02/MF A01

The genetically significant dose received by the Italian population due to diagnostic X-ray examination and radiopharmaceuticals was investigated and preliminary results are presented. A rough estimation of dosage gives about 30 mrem, in good agreement with the values obtained from authors in different industrialized countries. These studies are being carried out to reveal eventual abuses of diagnostic radiation sources and to take adequate corrective measures. Author (ESA)

N77-12684# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
HEALTH IMPLICATIONS OF THE RISKS CONNECTED WITH THE USE OF AMERICIUM 241 FOR LIGHTNING PROTECTION
M. Belli, M. Cremonese, and S. Greco 10 Dec. 1975 25 p refs In ITALIAN; ENGLISH summary
(ISS-R-75/16) Avail: NTIS HC A02/MF A01

Americium metabolism is reviewed together with some information on the biological and pathological effects following americium 241 contamination in order to assess the risk due to the use of radioactive isotopes in lightning conductor installations and the resulting implications on public health. Some aspects of radioprotection are presented and it is concluded that the use of americium 241 for lightning protection exposes the population to undue risks. ESA

N77-12685# Istituto Superiore di Sanita, Rome (Italy). Lab. di Fisica.
ELECTRON SPIN RESONANCE OF LYOPHILIZED BLOOD SAMPLE
M. Bomba, M. Flamini, P. L. Indovina, and A. Rosati 11 Dec. 1975 20 p refs In ITALIAN; ENGLISH summary
(ISS-P-75/17) Avail: NTIS HC A02/MF A01

Results obtained on lyophilized blood samples (whole blood, red cells, and plasma) from a control group are presented. The measurements show clearly the imperfections; of the lyophilization method in obtaining reproducible results. Consequently, it is without any biological meaning. The electron spin resonance of lyophilized blood, at least in the region of free radicals, is unlikely to be of value as a diagnostic screening test for cancer.
Author (ESA)

N77-12686# Illinois Univ., Chicago. Dept. of Materials Engineering.
A MODEL FOR ANALYTIC INVESTIGATION OF THREE-DIMENSIONAL HEAD-SPINE DYNAMICS Final Report, 1 Dec. 1973 - 30 Nov. 1975
T. Belytschko and L. Schwer Wright-Patterson AFB, Ohio AMPL Apr. 1976 212 p refs
(Contract F33615-74-C-4014)
(AD-A025911; AMRL-TR-76-10) Avail: NTIS HC A10/MF A01 CSCL 06/7

A three dimensional, discrete model of the human spine, torso and head was developed for the purpose of evaluating mechanical response in pilot ejection and it was developed in sufficient generality to be applicable to other body response problems, such as occupant response in aircraft crash and arbitrary loads on the head-spine system. There are no restrictions on the distribution or direction of applied loads, so a wide variety of situations can be treated. Results are presented for a variety of conditions, such as different rates on onset, ejection at angles, effects on lumbar curvature, and eccentric head loadings. It is shown that large initial curvatures and perfectly vertical acceleration loadings result in substantial flexural response of the spine, which cause large bending moments. It is further shown that the combination of the spine's low flexural stiffness, initial curvature, and mass eccentricity are such that stability cannot be maintained in a 10 g ejection without restraints or spine-torso-musculature interaction. GRA

N77-12687# Air Force Weapons Lab., Kirtland AFB, N.Mex.
ADJOINT MONTE CARLO GENERATED RADIATION RESPONSE FUNCTIONS FOR THE B-1 AIRCRAFT Final Report
Albert J. Alexander Apr. 1976 54 p refs
(AD-A025756; AFWL-TR-76-6) Avail: NTIS HC A04/MF A01 CSCL 06/18

The adjoint Monte Carlo radiation transport technique is used to calculate radiation response functions for the B-1 aircraft. These radiation response functions are given for the neutron dose and also for the neutron plus the secondary gamma dose. The response functions are given for the head and stomach positions of the left front crew member. They can be folded with any angle and energy dependent neutron and/or gamma ray free field exposure to give the radiation dose. The MORSE multigroup, coupled neutron-gamma ray, Monte Carlo code is used for the adjoint transport in the B-1 aircraft which is modeled with combinatorial geometry. The theory and equations needed to evaluate the coupling integral in terms of the statistical weight of the adjunction on the coupling surface are developed. GRA

N77-12688# Army Aeromedical Research Lab., Fort Rucker, Ala.
AEROMEDICAL REVIEW OF OXYGEN REQUIREMENTS OF US ARMY AVIATORS
Frank S. Pettyjohn and Roderick J. McNeil Apr. 1976 24 p refs
(AD-A024726; USAARL-76-19) Avail: NTIS HC A02/MF A01 CSCL 06/19

Aeromedical review of US Army aircraft oxygen design criteria and military specification indicates physiologic inconsistencies. Oxygen duration charts in use for U-21 aircraft are computed on the basis of military specification using inspiratory minute volume (IMV) of 13.12 liters per minute (LPM), normal temperature (70F), pressure, dry (NTPD). Current oxygen duration charts for the RU-21 aircraft using constant flow regulator have overstated oxygen availability of 62.3% at 10,000 feet and 18.7% at 15,000 feet. Type regulator and dilution schedule are listed for U-21 series aircraft. The current design inspiratory minute volume of 13.12 LPM NTPD is the basic design deficiency. The effects of the activity and stress of flight require an increase of design IMV. GRA

N77-12689# Human Factors Research, Inc., Goleta, Calif.
MOTION SICKNESS INCIDENCE: EXPLORATORY STUDIES

OF HABITUATION, PITCH AND ROLL, AND THE REFINEMENT OF A MATHEMATICAL MODEL Technical Report, Oct. 1973 - Apr. 1976

Michael E. McCauley, Jackson W. Royal, C. Dennis Wylie, James F. OHanlon, and Robert R. Mackie Apr. 1976 63 p refs
(Contract N00014-73-C-0040; NR Proj. 105-841)
(AD-A024709; Rept-1733-2) Avail: NTIS HC A04/MF A01 CSCL 06/19

A series of experiments on human subjects assessed the effects of pitch and roll and habituation on motion sickness incidence (MSI). Pitch and roll angular accelerations, even larger than expected at sea, failed to systematically increase MSI. Habituation was evidenced in susceptible subjects who received consecutive daily 1-hour or 2-hour exposures to vertical motion. Habituation was greater for the longer exposure and the more severe motions. A mathematical model describing MSI as a function of the frequency and acceleration of vertical oscillation was refined by including exposure time as an independent variable. Investigation of frequencies of oscillation above .5 Hz confirmed the prediction of the model that MSI continues to decrease as a function of frequency for all frequencies greater than approximately .16 Hz. GRA

N77-12690# Miami Univ., Oxford, Ohio.

EFFECTS OF SOUND ON THE VESTIBULAR SYSTEM Final Report

D. E. Parker, L. A. Ritz, R. L. Tubbs, and D. L. Wood Wright-Patterson AFB, Ohio AMRL Mar. 1976 83 p refs
(Contract F33615-73-C-4002; AF Proj. 7231)
(AD-A025969; AMRL-TR-75-89) Avail: NTIS HC A05/MF A01 CSCL 06/5

Vestibular responses have been evoked from guinea pigs, monkeys, and human beings following stimulation with static pressure, infrasound, sustained audiofrequency sound, and repetitive audiofrequency transients. These observations lead to suggestions concerning the manner in which sound affects the vestibular receptors as well as to proposals concerning levels of sound exposure that might disturb human performance by influencing behaviors mediated at least in part by the vestibular system. Author (GRA)

N77-12691# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

EFFECTS OF ACCELERATION ON SELECTED SERUM ENZYMES Final Report, Mar. - May 1974

Donald R. Sellers, Clarence M. Oloff, Ray D. Brown, and Vittorio Nino Mar. 1976 10 p refs
(AF Proj. 7222)
(AD-A025965; AMRL-TR-75-62) Avail: NTIS HC A02/MF A01 CSCL 06/19

Human volunteers were exposed to 30-second bouts of acceleration at 3, 4, 5, 6, and 7 G at each of three seat back angles on several different experimental days. Blood samples were taken immediately before the experiment and 24 hours later. Samples were analyzed for hematocrit, lactate dehydrogenase, lactate dehydrogenase isoenzyme distribution, creatine phosphokinase, creatine phosphokinase isoenzyme distribution, glutamate oxaloacetate transaminase, and glutamate pyruvate transaminase. None of the assayed biochemical parameters were outside normal clinical limits; however, small but statistically significant increases in creatine phosphokinase in two subjects and increases in lactate dehydrogenase and creatine phosphokinase in the subjects as a group were evident. GRA

N77-12692# EEG Research Inst., Oslo (Norway).

CLEARANCE AND SATURATION OF HYDROGEN GAS IN MAN WITH SPECIAL EMPHASIS ON THE BRAIN

Carl Wilhelm Sem-Jacobsen 1976 63 p refs
(Contract N00014-72-C-0345)
(AD-A025952) Avail: NTIS HC A04/MF A01 CSCL 06/19

Hydrogen gas clearance and saturation in the brain have been monitored in 22 subjects. The half time for hydrogen gas clearance/saturation in the human brain may fluctuate between 1/2 minute and 30 minutes in grey matter and between 6 - 14 minutes in white matter. The half time for hydrogen gas clearance and saturation in the ear-lobes may vary from 1 to 5 minutes, and from 2 to 20 minutes in the skeletal muscles. 8% CO2 added to the breathing air caused a drastic reduction of the half time for saturation/clearance in certain areas in the brain. Changes in respiration produce great fluctuation in the half time for gas clearance and saturation. Changes in blood flow in general or focal to some areas of the body produce drastic changes in the half time for gas clearance and saturation to the involved area. GRA

N77-12693# Joint Publications Research Service, Arlington, Va.

USSR ACADEMY OF MEDICAL SCIENCES

A. M. Chernukh, ed. 2 Dec. 1976 265 p refs Transl. into ENGLISH of the book "Akademiya Meditsinskikh Nauk SSSR" Moscow, Sovetskaya Entsiklopediya, 1976 176 p
(JPRS-68310) Avail: NTIS HC A12/MF A01

A description of the USSR Academy of Medical Sciences, its components and membership is given. Author

N77-12694# Naval Postgraduate School, Monterey, Calif.

THE EFFECT OF CONTINUOUS NOISE ON SHORT TERM MEMORY PERFORMANCE TASKS M.S. Thesis

Iver John Rivenes, III Sep. 1975 33 p refs
(AD-A025446) Avail: NTIS HC A03/MF A01 CSCL 05/10

Naval officers routinely perform a number of tasks requiring short term memory under conditions of moderate background noise levels. The performance of 20 Navy officers on a serial short term memory task was analyzed under two levels of difficulty and two different sound levels. The purpose of the experiment was to determine whether moderate intensity, continuous noise had an effect on short term memory. Analysis of the data collected indicated that continuous noise at a sound level pressure of 85 dB had no effect on the subjects' short term memory. Levels of difficulty resulted in a significant difference in performance on the serial short term memory task used in this experiment. Author (GRA)

N77-12695*# Illinois Univ., Urbana. Coordinated Science Lab.

PILOT INTERACTION WITH AUTOMATED AIRBORNE DECISION MAKING SYSTEMS Semiannual Progress Report, May - Oct. 1976

William B. Rouse, Yee-Yeen Chu, Joel S. Greenstein, and Rex S. Walden Oct. 1976 50 p refs
(Grant NSG-2119)
Avail: NTIS HC A03/MF A01 CSCL 05E

An investigation was made of interaction between a human pilot and automated on-board decision making systems. Research was initiated on the topic of pilot problem solving in automated and semi-automated flight management systems and attempts were made to develop a model of human decision making in a multi-task situation. A study was made of allocation of responsibility between human and computer, and discussed were various pilot performance parameters with varying degrees of automation. Optimal allocation of responsibility between human and computer was considered and some theoretical results found in the literature were presented. The pilot as a problem solver was discussed. Finally the design of displays, controls, procedures, and computer aids for problem solving tasks in automated and semi-automated systems was considered. LS

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N77-12696# Army Research Inst. of Environmental Medicine, Natick, Mass.

EFFECTIVENESS OF FOUR WATER COOLED UNDERGARMENTS AND A WATER COOLED CAP IN REDUCING HEAT STRESS

George F. Fonseca Dec. 1975 30 p refs

(AD-A025216; USARIEM-T-23/76) Avail: NTIS HC A03/MF A01 CSCL 06/17

The cooling provided by four different water cooled undergarments was directly measured on a heated copper manikin dressed in a basic hot-weather flight coverall, aircrew helmet, socks and black boots. This cooling, which represents absorption of the heat produced by the metabolic processes of the body plus that from the ambient environment in the cabin, was found to be almost directly proportional to the difference between the manikin skin temperature and the temperature of the cooling water at the inlet to a water cooled undergarment. Isolation of the manikin surface from the hot environments was provided by only a water cooled undergarment and the basic hot-weather clothing ensemble. Although these cooling garments did not, by themselves, completely isolate the manikin surface against heat gain from the hot environment, they did remove about one-half of the potential for heat gain from the ambient environment before the heat reached the manikin surface. The water cooled cap, which covered just the head (or only about 6% of the total body surface area) removed about 1/3 of the total metabolis heat production of a seated person. GRA

N77-12697# Webb Associates, Yellow Springs, Ohio.

SAMPLING AND DATA GATHERING STRATEGIES FOR FUTURE USAF ANTHROPOMETRY Final Report

Edmund Churchill Feb. 1976 43 p refs

(Contract F33615-73-C-4066; AF Proj. 7184)

(AD-A025240; AMRL-TR-74-102) Avail: NTIS HC A03/MF A01 CSCL 06/5

Beginning with a comprehensive review of anthropometric resources already available, this report serves as a guide to more refined and less costly methods of acquiring needed anthropometric data to meet changing military requirements and to accommodate changing military populations. Many sampling schemes are described and evaluated for their utility in meeting specific USAF needs. Various measurement and sampling errors are discussed and the effects of each type of error on the statistics of major importance in design problems are explained. A multi-faceted plan for the future acquisition of USAF anthropometric data is recommended. GRA

N77-12698# Army Materiel Command, Texarkana, Tex. Intern Training Center.

A FREE HEAD-MOVEMENT PUPILLOMETER SYSTEM Final Report

Alfred William Stillman, Jr. Aug. 1975 70 p refs

(AD-A025900; USAMC-ITC-02-08-75-114) Avail: NTIS HC A04/MF A01 CSCL 06/2

The report describes a realizable free head-movement solid-state pupillometer system using a 100-by-100 element charge-coupled device as the means of recording the diameter of the pupil of the eye. In this description are discussed basic concepts of pupillometers, charge-coupled devices, and the application to pupillometry of one specific charge-coupled device with supporting solid-state circuitry. Integrated into this report are considerations of safety, human factors, and system maintenance. GRA

N77-12699# Webb Associates, Yellow Springs, Ohio.

STATISTICAL CONCEPTS IN DESIGN

John T. McConville and Edmund Churchill May 1976 57 p refs

(Contract F33615-75-C-5003; AF Proj. 7184)

(AD-A025750; AMRL-TR-76-29) Avail: NTIS HC A04/MF A01 CSCL 06/14

In seeking a manageable way to deal with variations for a large range of body sizes, it is a common practice for designers to construct drafting board manikins, three-dimensional forms or computer simulations as human analogues. Often these analogues are based upon 5th, 50th, or 95th percentile values. Limitations of this approach are discussed in this paper which demonstrate fallacies underlying the assumptions that (1) the proportionality of various individuals is the same and (2) percentiles for body dimensions are additive. Focusing on the 5th and 95th percentile body forms where deviations in size and proportionality are most severe, the report recommends an improved approach to portray the body size of these segments of the population in design problems. A statistical analysis is made of the tails of the height-weight distribution to demonstrate the usefulness of subgroups or regression values. GRA

N77-12700# Naval Postgraduate School, Monterey, Calif.

INVESTIGATION AND EVALUATION OF A ZERO INPUT TRACKING ANALYZER (ZITA) M.S. Thesis

Ronald Edward James Mar. 1976 48 p refs

(AD-A025431) Avail: NTIS HC A03/MF A01 CSCL 05/10

This study was designed to evaluate a psychomotor testing instrument known as the ZITA (Zero Input Tracking Analyzer). This instrument was being considered as a prediction device in the selection of applicants for the U. S. Navy aircrew training program. Analysis of the data obtained from six subjects (all U. S. Navy pilots) over 26 hours of testing, showed the machine capable of consistent results in distinguishing between subjects with respect to this particular psychomotor task. A major disadvantage of the ZITA that became apparent was the amount of time (approximately 2 hours) required before learning curves were leveled out and the rate at which different individuals develop their learning curve. Author (GRA)

N77-12701# Naval Postgraduate School, Monterey, Calif.

AN ANALYSIS OF THE EFFECT OF A FLIGHT DIRECTOR ON PILOT PERFORMANCE IN A HELICOPTER HOVERING TASK M.S. Thesis

Timothy William Duffy Mar. 1976 54 p refs

(AD-A025680) Avail: NTIS HC A04/MF A01 CSCL 01/4

A fixed-base simulator evaluation of a flight director for maintaining longitudinal control of a helicopter in the hover mode of operation was made. Test subjects performed ninety-second precision hovering tasks utilizing two cockpit displays. The second display differed from the first only by the addition of the flight director indicator. The helicopter and each display were simulated on a hybrid computer. The hovering task consisted of minimizing root mean square longitudinal and vertical deviation from an initial equilibrium position. Root mean square performance data and numerical pilot opinion ratings were obtained. These data indicated significant improvement in performance when the flight director was being utilized. Author (GRA)

N77-12702# Michigan Univ., Ann Arbor. Highway Safety Research Inst.

A PREDICTION OF RESPONSE OF THE HEAD AND NECK OF US ADULT MILITARY POPULATION TO DYNAMIC IMPACT ACCELERATION FROM SELECTED DYNAMIC TEST SUBJECTS Annual Report, Apr. 1975 - Apr. 1976

L. W. Schneider, B. M. Bowman, R. G. Snyder, and L. S. Peck May 1976 164 p refs

(Contract N00014-75-C-1077; NR Proj. 105-832)

(AD-A025785; UM-HSRI-76-10; ATR-1) Avail: NTIS HC A08/MF A01 CSCL 06/19

Physical characteristics of the head and neck were measured on 18 male Navy volunteers who had previously undergone testing on the NAMRL sled facility at Michoud Station, New Orleans. Measurements include 55 standard anthropometric measures, 32 anthropometric measures of the seated subject, three dimensional head and neck range of motion, neck muscle reflex times in response to head jerks, and neck muscle voluntary isometric strength. These latter measurements were taken in both the sagittal and lateral planes. Measurement results were used to establish parameter values for the MVMA-2D Crash Victim Simulator data set in an attempt to reproduce the dynamic response of these volunteers to -Gx sled acceleration at 6 and 15 G's. Procedures used for computing the various parameter values and comparisons between predicted and experimental results are presented. In addition, measurement data for 18-24 year females taken previously have been utilized to predict the dynamic response that would be expected if these subjects were tested at 6 and 15 G's. GRA

N77-12703# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.

TEST PLOT EVALUATION OF A RECLINED COCKPIT SEAT AS AN AID TO G TOLERANCE AND PERFORMANCE Final Report, Sep. 1973 - Mar. 1975

John W. Frazier and Kenneth W. McElreath Jan. 1976 24 p refs

(AF Proj. 7222)

(AD-A025784; AMRL-TR-75-73) Avail: NTIS HC A02/MF A01 CSCL 06/17

Twenty-two student test pilots have participated in closed-loop tracking indoctrination runs on the Dynamic Environment Simulator. Each pilot flew through a series of profiles up to 6 G in both the conventional upright seat position and a 55 deg tilt back seat position. The subjective responses and pilot questionnaires are presented. GRA

N77-12704# Naval Aerospace Medical Research Lab., Pensacola, Fla.

DEVELOPMENT OF A PROTOTYPE EXPERIMENTAL PLAN TO EVALUATE STABILIZED OPTICAL VIEWING DEVICES. 2: INFLIGHT MEASURES OF AIRSICKNESS POTENTIAL

W. Carroll Hixson, Fred E. Guedry, Jr., Joel W. Norman, David D. Glick, and Roger W. Wiley 8 Mar. 1976 27 p refs Sponsored in part by Army

(AD-A025455; NAMRL-1223; USAARL-76-15) Avail: NTIS HC A03/MF A01 CSCL 05/8

Investigators at the Naval Aerospace Medical Research Laboratory and the U. S. Army Aeromedical Research Laboratory conducted a combined field and laboratory study to evaluate observer performance while using an improved XM-76 stabilized viewing device. Air-to-ground observations were made in a UH-1 aircraft, flying maneuvers modeled in part after a scout helicopter scenario. The experimental protocol was such that visual acuity data were collected under three different observation conditions: with the naked eye, with XM-76 operated in its normal stabilized mode, and with the XM-76 operated in a caged or nonstabilized mode. Measures of selected airsickness symptoms were derived from an onboard flight observer and from postflight questionnaires. The resulting data indicate that the level of airsickness symptoms manifested by the subject group while using the device was higher than the baseline level present when the observations were made without the device. In contradistinction to the hypothesis that the stabilization feature of such devices increases the airsickness potential, the general trend of the data showed the opposite effect. GRA

N77-12705# Quest Research Corp., McLean, Va.

FEASIBILITY OF IMPLEMENTING SPECIFIC PERFORMANCE MEASUREMENT TECHNIQUES Final Report

Diane G. Loental Wright-Patterson AFB, Ohio AMRL Mar. 1976 110 p refs

(Contract F33615-73-C-4121)

(AD-A025945; AMRL-TR-74-95) Avail: NTIS HC A06/MF A01 CSCL 05/9

The report presents two techniques for performance measurement in a manned weapon system. The particular system studied was the F-106 coplanar attack simulator located at the Systems Effectiveness Branch, Aerospace Medical Research Laboratory, Wright-Patterson Air Force Base, Ohio. The first technique involves a theoretical model of the human operator's flight control policies on the simulator. The second technique is empirical and derives performance measures from the simulator data. Author (GRA)

N77-12706# Federal Highway Administration, Washington, D.C. Traffic Systems Div.

THE EFFECT OF AUDITORY AND VISUAL PRESENTATION OF NAVIGATIONAL MESSAGES ON MESSAGE RETENTION Final Report

Frank P. Gatling Jun. 1976 27 p refs

(PB-256599/2; FHWA-RD-76-94) Avail: NTIS HC A03/MF A01 CSCL 05J

Navigational messages containing from two to seven units of information were presented to three groups of subjects. One group of subjects received the messages after they had seen an alerting sign and, in response to the sign, turned the radio to a specified frequency to receive the message (manual group). A second group received the messages automatically and aurally (automatic group). The third group received the information visually. Performance of the three groups is compared. Gra

N77-12707# Virginia Polytechnic Inst. and State Univ., Blacksburg. Dept. of Aerospace and Ocean Engineering.

NOTES ON THE COMPUTATION OF THE GENERALIZED ZETA AND DIGAMMA FUNCTIONS WITH PROGRAMS AND TABLES

W. H. Mason and B. E. Nerney Oct. 1974 38 p refs

(Contract N00014-72-A-0136-0001; NR Proj. 061-197)

(AD-A025134; VPI-Aero-023) Avail: NTIS HC A03/MF A01 CSCL 12/1

Function subprograms for the computation of the digamma function and generalized zeta function are presented. Some new analytic results are given, and tables of 20 place values of the functions are provided in order to check the computer codes. The digamma function is tabulated for $x = 0.5(0.5)10$, and the generalized zeta function is given for $s = 2(1)42$, $a = 0.05(.05)1(.1)2(.5)10(1)21$. Author (GRA)

N77-12708# Advisory Group for Aerospace Research and Development, Paris (France).

VISUAL AIDS AND EYE PROTECTION FOR THE AVIATOR

Thomas J. Tredici (School of Aerospace Medicine, Brooks AFB, Tex.) Oct. 1976 89 p Presented at the Aerospace Med. Panel Specialist Meeting, Copenhagen, 5-9 Apr. 1976

(AGARD-CP-191; ISBN-92-835-0177-2) Avail: NTIS HC A05/MF A01

Information concerning visual aids and eye protective devices used by the aviator is discussed. Among the topics considered were: protection from retinal burns and flash blindness due to atomic flash; vision with the AN/PVS-5 night vision goggle; in-flight evaluation of optically stabilized target acquisition devices; and the correction of presbyopia.

N77-12709# Royal Aircraft Establishment, Farnborough (England). Neurosciences Div.

EYE PROTECTION, PROTECTIVE DEVICES AND VISUAL AIDS

D. H. Brennan *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 12

Avail: NTIS HC A05/MF A01

The major ocular hazards encountered in military aviation are discussed and some protective measures which may be adopted are described. The hazards considered are solar glare, bird strike, wind blast, miniature detonating cord, lasers and nuclear flash. The role of image intensifiers in aviation is also discussed. Author

N77-12710# Naval Air Development Center, Warminster, Pa. Crew Systems Dept.

INTEGRATION OF AVIATORS EYE PROTECTION AND VISUAL AIDS

Gloria T. Chisum and Phyllis E. Morway *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 7

Avail: NTIS HC A05/MF A01

Recent technological developments have resulted in additional functions being assigned to the helmet and visor. The additional functions range from static aids for distant vision to dynamic displays of information for use in weapon control and guidance, and aircraft management and situational information. Basic requirements for the protective equipment were established. The expanded functions for the protective equipment require that modifications be made in the equipment configuration. The modifications must be accomplished without sacrificing the basic functions of protection. Accomplishment of these two goals requires cooperation between the display designers and crew equipment specialists. Author

N77-12711# Sandia Labs., Kirtland AFB, N. Mex.

PROTECTION FROM RETINAL BURNS AND FLASHBLINDNESS DUE TO ATOMIC FLASH

Billy J. Pfofp (ASD/SMLS Life Support SPO, Wright-Patterson, AFB, Ohio), J. Thomas Cutchen, and J. O. Harris *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 6 refs

Avail: NTIS HC A05/MF A01

Transparent ferroelectric ceramic material, lead lanthanum zirconate titanate (PLZT), has enabled the development of large aperture electrooptic shutters in goggle or window type formats which provide sufficiently rapid decrease in transmitted light intensity to prevent flashblindness and permanent retinal burn from ultraviolet, visible and infrared radiation encountered in nuclear explosions. Author

N77-12712# Air Force Systems Command, Brooks AFB, Tex.

USAF AVIATOR CLASSES. HGU-4/P: HISTORY AND PRESENT STATE OF DEVELOPMENT

Thomas J. Tredici *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 6 refs

Avail: NTIS HC A05/MF A01

The aviator goggle HGU-4F has the important fundamental role of enhancing and protecting the vision of U.S. Air Force aviators. The spectrum of presently available lenses is reviewed. Studies to improve the product are detailed, in particular, the impact tests, both drop ball and ballistic, of glass (heat treated and chemical ion exchange) and plastic (CR-39 and polycarbonate). The practical tests of plastic versus glass lenses used in the field is reviewed. The culmination of this research has resulted in the presently available product, one that is felt to be the best that the state-of-the-art can presently produce. Author

N77-12713# Centre Principal d'Expertises Medicales du Personnel Navigant, Paris (France).

CONCERNING FLIGHT AND THE CORRECTION OF PRESBYOPIA [A PROPOS DU VOL ET DE LA CORRECTION DES PRESBYTES]

J. P. Chevaleraud and Ch. Corbe *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 4 refs In FRENCH

Avail: NTIS HC A05/MF A01

The use of eyeglasses by civil and military pilots over the age of 40 is investigated. The need for special lenses for flight use is discussed. A method is presented for determining the corrective measures needed for subjects with diminished power of accommodation for near objects. A.H.

N77-12714# Service de Sante pour l'Armee de l'Air, Paris (France).

FLIGHT FITNESS AND PLIANT CONTACT LENSES [APTITUDE AU VOL ET LENTILLES DE CONTACT SOUPLES]

J. P. Chevaleraud and G. Perdriel *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 4 refs In FRENCH

Avail: NTIS HC A05/MF A01

Four subjects were tested in a pressurized tank to determine the physiological effects of flexible contact lenses having 40% absorbency. Corneal sensitivity, ocular tone, and the permeability of lachrymal ducts were observed. Lachrymal secretion and binocular vision were measured. The advantages of soft contact lenses over hard lenses is discussed. A.H.

N77-12715# Army Aeromedical Research Lab., Fort Rucker, Ala.

VISION WITH THE AN/PVS-5 NIGHT VISION GOGGLE

Roger W. Wiley and Frank F. Holly *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 12 refs

Avail: NTIS HC A05/MF A01

Results are presented from a series of experiments in which visual performance using the AN/PVS-5 night vision goggle was measured. Visual modulation transfer functions of the man-goggle system were determined and compared to results obtained with unaided viewing. The man-goggle system performance was superior to unaided visual performance at average target luminances equivalent to 5% and 25% moon illuminances. A+, a target luminance equivalent to a full moon illuminance, unaided visual performance was superior at higher spatial frequencies, while remaining poorer at the lower spatial frequencies. Using a modified Howard-Dolman apparatus, it was determined that the stereoscopic threshold was degraded with the man-goggle system. Field measurements of relative depth discrimination using all available visual cues showed that performance of the man-goggle system was statistically equivalent to unaided phototopic visual performance at intermediate viewing distances, but was inferior to unaided viewing at distances of 500 feet or greater. Author

N77-12716# Centre de Recherches du Service de Sante des Armees, Clamart (France).

EXPERIMENTAL STUDY OF VISION DIMMING IN AN ANIMAL [ETUDE EXPERIMENTALE DE L'EBLOUISSEMENT CHEZ L'ANIMAL]

L. Court, J. P. Chevaleraud, G. Perdriel, and M. Basin *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 11 refs In FRENCH

Avail: NTIS HC A05/MF A01

Vision dimming is a temporary deficit in visual perception in a subject submitted to intense luminous energy, at a level higher than that of his level of adaptation. Electrodes were implanted in a monkey and a rabbit to study the electrophysiological rectification and behavior caused by glare. The time of recuperation is measured. Transl. by A.H.

N77-12717# Army Aeromedical Research Lab., Fort Rucker, Ala.
IN-FLIGHT EVALUATION OF HAND-HELD OPTICALLY STABILIZED TARGET ACQUISITION DEVICES
David D. Glick *In* AGARD Visual Aids and Eye Protection for the Aviator Oct. 1976 p 13

Avail: NTIS HC A05/MF A01

Several target acquisition devices are compared in-flight. Considering size, weight, complexity, and performance in an in-flight visual acuity task, one of the devices looked promising. A group of twenty-nine subjects used a single device in a scout helicopter flight scenario. The device produced motion sickness and the experimental plan was designed to assess this as well as visual acuity in flight. The subjects flew the scenario first with the unaided eye and then with the device in both a stabilized and unstabilized (caged) mode. The latter two flights were counterbalanced across subjects. Following the flight phase, the subjects were given a series of tests to evaluate individual susceptibility to motion sickness. Performance in the visual acuity task was significantly correlated with the airsickness rating of an on-board experimenter; however, there was no significant difference between the magnitude of the symptoms observed when the device was stabilized and the magnitude when caged. Author

N77-12718*# National Aeronautics and Space Administration. Ames Research Center, Moffett Field, Calif.
ON THE HABITABILITY OF MARS: AN APPROACH TO PLANETARY ECOSYNTHESIS
M. M. Averner, ed. and R. D. MacElroy, ed. Washington 1976 114 p refs
(NASA-SP-414) Avail: NTIS HC A06/MF A01 CSCL 06F

The possibility of utilizing Mars as a habitat for terrestrial life, including man, is examined. Available data, assumptions, and speculations on the climate, physical state, and chemical inventory of Mars are reviewed and compared with the known requirements and environmental limits of terrestrial life. No fundamental, insuperable limitation of the ability of Mars to support a terrestrial ecology is identified. The lack of an oxygen-containing atmosphere would prevent the unaided habitation of Mars by man. The present strong ultraviolet surface irradiation is an additional major barrier. The creation of an adequate oxygen and ozone-containing atmosphere on Mars may be feasible through the use of photosynthetic organisms. The time needed to generate such an atmosphere, however, might be several millions of years. This period might be drastically reduced by the synthesis of novel, Mars-adapted, oxygen producing photosynthetic strains by techniques of genetic engineering, and modifying the present Martian climate by melting of the Martian polar caps and concomitant advective and greenhouse heating effects. Author

N77-13634 Texas Univ., Austin.
STUDIES OF THE ISOTOPE CHEMISTRY OF MOLECULAR OXYGEN IN BIOLOGICAL SYSTEMS Ph.D. Thesis
Woei-Lih Jeng 1976 80 p
Avail: Univ. Microfilms Order No. 76-26643

Dissolved oxygen and its del 0-18 value show striking correlations in depth profiles of the open Gulf of Mexico and shallow marine bays. Diurnal variation of dissolved oxygen and its del 0-18 value in the marine ecosystem of Redfish Bay is clearly observed and strongly correlated. Isotope effects in biological processes, photosynthesis and respiration, were investigated to explain the fractionation of dissolved stable oxygen isotopes in the marine environment. The relationship observed between dissolved oxygen and its del 0-18 value in the depth profile and diurnal variation is a biological effect. The equilibrium isotope effect in the reaction, oxygen in equilibrium with oxyhemoglobin, which relates to the process of respiration, was studied. The enrichment of stable oxygen isotopes due to respiration is not purely a kinetic isotope effect. The inorganic oxidation of ferrous ion enriches the O-18 of the oxygen pool. Dissert. Abstr

N77-13635 Dartmouth Coll., Hanover, N.H.
COMPUTER BASED ELECTRON BEAM TREATMENT PLANNING Ph.D. Thesis
Joseph Yen Ting 1976 305 p
Avail: Univ. Microfilms Order No. 76-24970

The development of a computer based system for electron beam treatment planning in radiation therapy is discussed. Two major projects were completed to obtain the patient and machine information required: (1) a hardware-software project to obtain tissue density of internal structures of patients; and (2) a detailed study of the radiation characteristics of the BBC-45 MeV. An electronic device was designed and built to accept transmission intensity data from patients examined with a dual probe scanner and to transmit this data to a large time sharing computer nearby. Dissert. Abstr

N77-13636 Iowa Univ., Iowa City.
A STUDY OF THE MECHANISM OF THE ALTERATION OF CARBON MONOXIDE-INDUCED LETHALITY Ph.D. Thesis
Joseph Marcus Winston 1976 115 p
Avail: Univ. Microfilms Order No. 76-26351

The hypothesis that there are non-carboxyhemoglobin related actions of carbon monoxide which contribute to its lethality was investigated. Possible clinically significant interactions between carbon monoxide and drugs were also studied. An experimental design was developed which included determining the effect of various pretreatments, including drugs and acute pre-exposure to carbon monoxide or hypoxic hypoxia, on carbon monoxide and hypoxic hypoxia lethality. If the lethal mechanism of carbon monoxide and hypoxic hypoxia are the same, it was felt that pretreatments should alter lethality in a similar manner. Differing alternations of lethality by pretreatments would be evidence for different lethal mechanisms of carbon monoxide and hypoxic hypoxia. Dissert. Abstr

N77-13637 Wayne State Univ., Detroit, Mich.
CRITICAL BANDWIDTH OF THE LOUDNESS DISCOMFORT LEVEL AND THE ACOUSTIC REFLEX Ph.D. Thesis
Larry Allen Frazier 1976 106 p
Avail: Univ. Microfilms Order No. 76-26130

The relationship between acoustic reflexes and loudness discomfort levels was investigated. Acoustic reflex thresholds and loudness discomfort levels were obtained from sixteen normal hearing subjects for nine stimuli including speech babble, a 1000 Hz pure tone and seven noise bands centered around 1000 Hz (10 Hz, 30 Hz, 100 Hz, 1/2, 1, 2, and 4 octaves). Acoustic reflex thresholds were measured on an electroacoustic impedance bridge and subjects tracked their loudness discomfort levels through the use of a recording attenuator. The study was designed to compare the acoustic reflex and loudness discomfort level along six dimensions: (1) mean thresholds, (2) acoustic reflex-loudness discomfort level correlations, (3) size of the critical bandwidth, (4) shape of threshold curves as a function of stimulus bandwidth, (5) pure tone vs. narrow band noise threshold, and (6) pure tone vs. speech thresholds. Dissert. Abstr

N77-13638 Washington Univ., Seattle.
EFFECTS OF RATE AND DIRECTION OF AIR PRESSURE CHANGES ON TYMPANOMETRY Ph.D. Thesis
Peggy Sue Williams 1976 178 p
Avail: Univ. Microfilms Order No. 76-25472

The effect of the variables of rate and direction on automatic tympanometry are explored. Three features of the tympanogram that might be affected by these variables, peak amplitude, peak pressure and shape, were examined in two distinctly different populations. Group I subjects had normal tympanic membranes, and Group II subjects had flaccid tympanic membranes. Both groups had apparently normal middle-ear function. Directly addressed were the questions: (1) what effect on amplitude, peak pressure, and shape of the tympanogram is generated by

manipulation of the rate of air pressure change? and (2) what effect on amplitude, peak pressure, and shape of the tympanogram is generated by manipulation of the direction of air pressure change? The rate of air pressure change alters the amplitude of tympanograms in both groups, and direction has no effect.
Dissert. Abstr.

N77-13639 Wichita State Univ., Kans.
HEMISPHERIC ASYMMETRY OF PERCEPTUAL AND ELECTROENCEPHALIC RESPONSES TO SPEECH STIMULI Ph.D. Thesis
Marilyn Park Warren 1976 259 p
Avail: Univ. Microfilms Order No. 76-25358

Stimulus and task effects on perceptual and electroencephalic asymmetry of responses to speech stimuli were examined in a two-part investigation. A total of 18 subjects listened to diotic and dichotic consonant-vowel (CV) syllables consisting of a voiceless bilabial stop (p/,/t/, or /k/) plus the vowel /a/, spoken by a man, woman, or child. The stimulus tape contained equal numbers of four types of CV pairs: diotic CV/diotic voice; diotic CV/dichotic voice; dichotic CV/diotic voice; and dichotic CV/dichotic voice. Subjects heard all stimuli twice, once performing a phonemic discrimination task in which they identified the two CVs which they perceived, and once performing a non-phonamic discrimination task in which they identified the two voices they perceived. Results for 12 right-handed female subjects showed a right ear advantage for the phonemic discrimination task but no ear advantage for the non-phonemic discrimination task.
Dissert. Abstr.

N77-13640 Illinois Univ., Urbana-Champaign.
INEQUALITY BETWEEN INSPIRED AND EXPIRED GASEOUS NITROGEN IN MAN: FACT OR TECHNICAL ARTIFACT? Ph.D. Thesis
Ingrid Charlotte Kupprat 1976 132 p
Avail: Univ. Microfilms Order No. 76-24122

Gaseous N2 exchange was measured in nine healthy young men, once while fasting and once 1 1/2 hours after high protein ingestion. Data were collected during bed rest for the last 3 hours of a 17-hour period of controlled diet, environment and activity. On the average, an N2 inequality was observed. High protein ingestion resulted in a significantly greater N2 evolution than fasting. However, there was a significant linear trend in the mean N2 evolved each hour. From comparison of the observed variations with subjects, diet and time with the expected variation of instrumentation to measure N2, it concluded that inequality between the minute volume of N2 inspired and expired at rest is a real phenomenon, not a technical artifact. These results raise questions as to the universal applicability of the traditional open-circuit technique for measuring respiratory gas exchange, which assumes that N2 inspired equals N2 expired.
Dissert. Abstr.

N77-13641 Ohio State Univ., Columbus.
THE EFFECT OF COLOR ON THE LOCALIZATION OF THE SOURCES OF THE HUMAN VISUAL EVOKED RESPONSE Ph.D. Thesis
James Patrick Ary 1976 108 p
Avail: Univ. Microfilms Order No. 76-24551

Stimulation of left or right half visual fields produces different evoked potential distributions across the occipital scalp. One model for the source of this potential distribution is an equivalent dipole located near the medial fissure and oriented tangential to the occipital scalp. It was found that stimulating with white lateral half checkerboard flashes produces two changes: (1) a shift toward a scalp surface-radial evoked potential distribution, and (2) a shift of localization toward the midline. To clarify the color dependence of this effect, the brightness of the adapting field was raised above rod saturation to 2,000 cd/sq m, and flashed checks of four different colors were employed as stimuli. Two of the three subjects tested showed potential distributions for yellow stimuli which were distinctly different from the distributions for the other colors.
Dissert. Abstr.

N77-13642 Washington Univ., Seattle.
TRANSIENT RESPONSES TO SHIFTS OF ANGLE OF ILLUMINATION IN RETINAL NEURONS Ph.D. Thesis
Jack Henrik Belgum 1976 79 p
Avail: Univ. Microfilms Order No. 76-25388

Intracellular recordings were made from Necturus retinal neurons. The retina was alternately illuminated by either of two large, overlapping fields of background light incident upon the retina at different angles. A test flash of the same angle of incidence as one of the two backgrounds was presented on each background in turn. The intensity of one of the two backgrounds was systematically varied over a range of intensities likely to include an intensity matching the other background. Cells exhibiting the properties of receptors responded to each exchange with a transient hyperpolarization that could not be explained by an intensity mismatch. Bipolar cells produced equal and sustantial responses to both exchanges at the matched intensity, as did amacrine cells. Ganglion cells also produced transient responses to exchange.
Dissert. Abstr.

N77-13643 Pittsburgh Univ., Pa.
TRANSIENT PHYSIOLOGICAL RESPONSES TO STEP CHANGES IN WORK RATE Ph.D. Thesis
Thomas Edward Bernard 1975 96 p
Avail: Univ. Microfilms Order No. 76-25911

The transient responses of heart rate, pulmonary ventilation, oxygen uptake, and carbon dioxide elimination were measured on a breath-to-breath basis for six young men. Three pairs of step changes in work rate were applied on a laddermill ergometer such that each pair represented an increasing change and a decreasing change in work rate over the same range. The transfer functions relating the work application to the responses were determined through curve fitting. Heart rate responses were characterized by a second order function. Pulmonary ventilation was characterized by an immediate zero order change followed by a delayed first order change. Both oxygen uptake and carbon dioxide elimination followed a simple first order response. For pulmonary ventilation, oxygen uptake, and carbon dioxide elimination, the responses displayed the qualities of a linear system. The heart rate response displayed non-linear characteristics.
Dissert. Abstr.

N77-13644 Virginia Univ., Charlottesville.
THE MICROCIRCULATORY BASIS OF FUNCTIONAL HYPEREMIA IN STRIATED MUSCLE Ph.D. Thesis
Richard John Gorczynski 1976 215 p
Avail: Univ. Microfilms Order No. 76-25012

An investigation of the microcirculation of striated muscle was undertaken in an effort to: (1) directly describe the behavior of the arterioles and capillary bed during striated muscle contraction, (2) investigate the hypothesis that a change in the oxygen tension of contracting striated muscle is involved either directly by an effect on the vascular smooth muscle of the arterioles, or indirectly, via an effect upon striated muscle metabolism in the medication of contraction induced arteriolar vasodilation, and (3) to investigate the possibility that the release of potassium by active muscle mediates the initiation of functional arteriolar vasodilation during contraction. Experiments were performed on the cremaster muscle of hamsters, prepared for in vivo microscopy of the microcirculation.
Dissert. Abstr.

N77-13645 California Univ., Los Angeles.
HUMAN EEG RESPONSE TO CERTAIN RHYTHMIC PATTERNED AUDITORY STIMULI, WITH POSSIBLE RELATIONS TO EEG LATERAL ASYMMETRY MEASURES AND EEG CORRELATES OF CHANTING Ph.D. Thesis
Linda Jean Rogers 1976 119 p
Avail: Univ. Microfilms Order No. 76-25237

Human EEG responses to simple, rhythmic visual and auditory stimuli (sinusoidally modulated white light, and sinusoidally modulated white noise) were reported. In addition, a contrast-evoked response was reported for patterned rhythmic visual stimulation. A human EEG response to patterned auditory stimulation is investigated. The patterned rhythmic stimuli presented were music and chanting. The complex nonrhythmic stimulus was conversational speech. The EEG driving measures developed were studied in relation to two other areas of current EEG research. The first area concerns lateral asymmetries in EEG intensity (specifically, parietal alpha band (8-12 Hz) intensity) correlated with modes of cognition hypothesized to require differential participation of the cerebral hemispheres. The second related area concerns EEG correlates of religious meditation.
Dissert. Abstr.

N77-13646 Saint Louis Univ., Mo.
HUMAN PHYSIOLOGICAL RESPONSE TO HYPERHYDRATION IN A HOT ENVIRONMENT Ph.D. Thesis
Ronald Alvin Weiss 1975 215 p
Avail: Univ. Microfilms. Order No. 76-25831

The physiological responses of six hyperhydrated human male subjects working in both 23 C D.B. and 41 C D.B. environments were compared to their own normally hydrated control responses under the same test conditions. Hyperhydration was evoked by ingesting distilled, deionized water (37 C) with a volume equal to 2% of individual body weight and then sustained by periodic replacement of all fluids lost. After each resting subject sustained a diuresis of at least 12 ml/minute for 45 minutes, he exercised on a bicycle ergometer for two consecutive thirty minute periods. Plasma volume varied inversely with both ambient temperature and exercise level when normally hydrated but expanded 1-2% above resting control values when hyperhydrated and exercising in the 23 C environment. Plasma osmolality and sodium concentration decreased about 1%, and protein concentration decreased approximately 4% in the presence of this expanded plasma volume. Dissert. Abstr.

N77-13647 Wisconsin Univ., Madison.
EFFECT OF LOAD, SPEED, AND CONFIGURATION ON THE ELECTROMYOGRAPHIC ACTIVITIES OF THE SKELETAL MUSCLES Ph.D. Thesis
Norman Richard Miller 1976 437 p
Avail: Univ. Microfilms Order No. 76-18898

The feasibility of utilizing the electromyographic output of the skeletal muscles (in conjunction with a mathematical musculoskeletal model) for quantification of muscle response to load and speed variations during human activities is examined. The superficial muscles of the lower extremity are considered. A specially instrumented bicycle ergometer is used to provide controlled (and reasonably repetitive) activity cycles for different load and speed conditions. The electromyograms from ten superficial muscles are treated by several data analysis techniques including spectral evaluations of the nonstationary signal. A noval hybrid computing procedure enabling static simulation of the dynamic activity at a particular posture is described. Results are discussed. Dissert. Abstr.

N77-13648*# Lockheed Missiles and Space Co., Sunnyvale, Calif.
STARPAHC INTERIM EVALUATION REPORT, MAY 1975 - APRIL 1976
15 Jun. 1976 164 p
(Contract NAS9-13170)
(NASA-CR-151126; LMSC-D500704) Avail: NTIS HC A07/MF A01 CSCL 06E

The primary goals of the STARPAHC Program are to provide data for developing health care for future manned spacecraft, and to establish the feasibility of the STARPAHC concept for improving the delivery of health care to remote areas on earth. Accordingly, the hardware and medical evaluations initiated during the first 6 months of system operation were continued and expanded during the second 6-month period. The evaluations are based on what has proven to be a relatively stabilized 6-month period wherein system failures which occurred during the initial shakedown period in the first 6 months have been minimized. Early trends and performance data reported in the first semi-annual report were reexamined to either verify, modify or change earlier conclusions. The highlights are given of the total year of operation with emphasis on comparisons between the first and second semi-annual reporting period. In addition, an early analysis of costs is summarized. Author

N77-13649# Nederlands Instituut voor Praeventieve Geneeskunde TNO, Leiden.
RECORDING AND PROCESSING OF ELECTROENCEPHALOGRAMS: DESCRIPTION OF TECHNIQUES [REGISTRATIE EN VERWERKING VAN ELECTRO ENCEPHALOGRAMMEN: BESCHRIJVING VAN METHODIEKEN]
J. D. Nije and H. P. DeRoos Jun. 1975 47 p refs In DUTCH
Avail: NTIS HC A03/MF A01

A method to record electroencephalography (EEG) data on magnetic tape and to process the data by means of a digital computer is described. The IBM-1800 computer was used to digitalize and filter the EEG signals for processing on an IBM-370 computer. Using FORTRAN 4 the following spectra can be calculated: auto spectrum, cross-spectrum, and coherence function. The reliability of these spectra is discussed and the Spest (spectrum estimation) program is dealt with. The EEG recording system was tested by noise measurement, involving Fourier transformation. ESA

N77-13650# Naval Medical Research and Development Command, Bethesda, Md.
BIBLIOGRAPHY OF REPORTED BIOLOGICAL PHENOMENA (EFFECTS) AND CLINICAL MANIFESTATIONS ATTRIBUTED TO MICROWAVE AND RADIO-FREQUENCY RADIATION, SUPPLEMENT NUMBER 7 Medical Research Interim Report
Zorach R. Glaser May 1976 30 p refs
(MF51524015)
(AD-A025354) Avail: NTIS HC A03/MF A01 CSCL 06/18

More than 350 additional references on the biological responses to radio frequency and microwave radiation, published up to May 1976, are included in this bibliography of the world literature. Particular attention has been paid to the effects of non-ionizing radiation on man at these frequencies. The citations are arranged alphabetically by author (where possible), and contain as much information as possible so as to assure effective retrieval of the original documents. Soviet and East European literature is included in detail. This report is the seventh supplementary 'up-dated' bibliographic listing to Naval Medical Research Institute. GRA

N77-13651# Nederlands Instituut voor Praeventieve Geneeskunde TNO, Leiden.
WORKLOAD OF THE RADAR-AIR TRAFFIC CONTROLLERS AT SCHIPHOL Interim Report [INTERIMRAPPORT WERKBELASTING RADAR-LUCHTVERKEERSLEIDERS SCHIPHOL]
C. K. Pasmooij Jun. 1975 29 p refs In DUTCH
(IR-1) Avail: NTIS HC A03/MF A01

The workload at the Amsterdam airport was measured with a view to analyzing mental load factors and to studying the effect of task performance on the air traffic controller. Number and content of the air traffic information strips, radio-telephony communication, coordination with other air traffic sectors, and telephone calls with other air traffic control centers were registered for five air traffic controllers during the week of Aug. 6, 1973. The results of the task analysis parameters were evaluated and preliminary conclusions were made. ESA

N77-13652# Tufts Univ., Medford, Mass. Inst. for Psychological Research.
HUMAN FACTORS ENGINEERING BIBLIOGRAPHIC SERIES. VOLUME 5: 1967 LITERATURE
Paul G. Ronco and Stanley Lippert Mar. 1976 294 p
(AD-A025395; HEL-Bib-Vol-5) Avail: NTIS HC A12/MF A01 CSCL 05/5

This document is the fifth in a series of bibliographies covering the human factors engineering literature. It covers most of the journal target articles for the year 1967. GRA

N77-13653 Wayne State Univ., Detroit, Mich.
VALIDATION STUDY OF THREE-DIMENSIONAL CRASH VICTIM SIMULATOR FOR PEDESTRIAN-VEHICLE IMPACT Ph.D. Thesis
Arvind Jiwajee Padgaokar 1976 315 p
Avail: Univ. Microfilms Order No. 76-26164

Minimizing injury during pedestrian vehicle impacts is studied using analytical simulation. The bases for the validation of a complex three-dimensional model are proposed. A method for the accurate measurement of three dimensional angular acceleration was developed and used to define completely the kinematics of the pedestrian three dimensional motion. For the sake of interchangeability of data, anatomically based coordinate systems were defined for many body segments using anthropometric landmarks. A brief description of the three-dimensional crash victim simulator is given. Impact data obtained under three different situations were used for validation of the model. A comparison between the experimental response and that generated by the analytical simulation was made. Dissert. Abstr.

N77-13654 Wayne State Univ., Detroit, Mich.
FULL SCALE EXPERIMENTAL SIMULATION OF PEDESTRIAN-VEHICLE IMPACTS Ph.D. Thesis
Kenneth Wayne Krieger 1976 290 p
Avail: Univ. Microfilms Order No. 76-26150

A series of eight full-scale experiments simulating pedestrian vehicle impacts was carried out using an extensively instrumented anthropomorphic dummy and four equally well instrumented unembalmed cadavers. Tests sought to establish body segment kinematics, including linear and angular acceleration. Impact characteristics during initial contact with the vehicle were studied in relation to those during subsequent ground contact. Further experiments were performed to determine force deflection characteristics of vehicle-pedestrian contact, anthropometric (inertial) properties of human body segments, and spring and viscous coefficients of the joints and joint stops. Dissert. Abstr.

N77-13655*# Martin Marietta Corp., Denver, Colo.
COMPARISON OF THE NONLINEAR DYNAMIC CHARACTERISTICS OF BARBER S-2 AND ASF RIDE CONTROL FREIGHT TRUCKS
P. Abbott Sep. 1976 42 p refs
(Contract NAS8-29882)
(NASA-CR-150113; MCR-76-475) Avail: NTIS HC A03/MF A01 CSCL 05H

The results of an experimental and analytical program to define the load deflection characteristics of a Barber S-2 freight truck and to compare these characteristics to those of an ASF freight truck of the same load capacity are presented. The comparison of the two trucks is made on a parameter basis and on the basis of the wheel/rail loads induced by track misalignment. The results indicate there is very little difference in the parameters and the response of the two trucks. This is of course qualified by the assumptions required in the development of the mathematical models. Author

N77-13656# Nederlands Instituut voor Praeventieve Gezondheidskunde TNO, Leiden.
HUMAN COMMAND AND CONTROL TASKS: DESCRIPTION OF AN INVESTIGATION ON FOUR DIFFERENT COMMAND AND CONTROL TASKS [MENSELIJKE STUUR- EN REGELTAKEN. VERSLAG VAN EEN ONDERZOEK BIJ VIER VERSCHILLENDE STUUR- EN REGELTAKEN]
C. L. Ekkers, W. T. M. Ooijendijk, and J. J. Schwarz Aug. 1975 141 p refs In DUTCH Sponsored in part by Min. van Econ. Zaken, and Min. van Sociale Zaken
Avail: NTIS HC A07/MF A01

The pilot phase of an investigation on the conditions under which command and control tasks are carried out was analyzed. The investigation was made on the personal, task, and social system level. The planning of the investigation is dealt with and the four tasks are described: train scheduling of the Netherlands Railways; operation and control of a natural gas based power station; hospital patients under narcosis; power supply and safety of the Netherlands Railways. Observations of the tasks were made and questionnaires were filled in. The results are discussed and preliminary conclusions drawn. ESA

N77-13657# Technische Hogeschool, Delft (Netherlands). Dept. of Aeronautical Engineering.
PILOT'S TRACKING BEHAVIOUR UNDER ADDITIONAL WORKLOAD
R. J. A. W. Hosman Jun. 1975 91 p refs
(VTH-199) Avail: NTIS HC A05/MF A01

An experiment to study the influence of task interference on the information processing of the human pilot is described. Two hypothetical limited capacity models of human information processing, the multi-channel model and the single-channel model, are reviewed and the results of the experiment are discussed in relation to these models. The experimental task consisted of a single axis tracking task under additional workload. The three controlled elements used were a simulated transport aircraft at three different center of gravity positions, at which it was stable, neutral, and ustable, respectively. The forcing function was a gust signal acting on the simulated aircraft. The additional loading task was an auditory binary choice task. The results of the experiment tend to favor the single-channel model of human information processing. Author (ESA)

N77-13658# Air Force Flight Dynamics Lab., Wright-Patterson AFB, Ohio.
LOW VISIBILITY LANDING PILOT MODELING EXPERIMENT AND DATA, PHASE 1 Final Report, May - Sep. 1974
Randall V. Gressang, Daniel L. Kugel, John R. Stone, and Joseph E. Pollard Apr. 1976 394 p refs
(AF Proj. 2187)
(AD-A025885; AFFDL-TR-75-41) Avail: NTIS HC A17/MF A01 CSCL 01/2

This report describes an experiment conducted to provide data for constructing a mathematical pilot model for low visibility landing. The experiment was conducted using a hybrid flight simulator equipped with a three degree of freedom motion system and a terrain board visual system. The aircraft simulated was a C-135B, and low visibility was simulated using a sky plate in the visual system. Pilots were obtained from the USAF Instrument Flight Center. Gust disturbances were used to increase pilot workload. The worst visibility simulated was Category 2 minimums. GRA

N77-13659# Army Combined Arms Combat Developments Activity, Fort Leavenworth, Kans.
ANALYSIS OF PHASE 2A OF FE 43.8
Rudolph J. Pabon, Robert A. Davison, and William I. Parks Feb. 1976 90 p refs
(AD-A025823; CACDA-TR-2-76) Avail: NTIS HC A05/MF A01 CSCL 17/8

This report analyzes data collected from Field Experiment 43.8, the ground-to-air visual detection experiment. Phase IIA was a one-sided experiment using AH-1G and OH-58 helicopters for detection at ranges from 1 to 5 kilometers by ground observers with unaided vision. The experiment provided

data on the time required for a ground observer to detect an observation helicopter, an attack helicopter (AH), or an attack helicopter team (AHT) and the frequency of detection for each configuration while situated in a firing position. Independent variables tested in the experiment were range, search sector, canopy or no canopy helicopters, lateral or no lateral movement, sky or terrain background, single ship or helicopter team presentation, and for multiple pop-up tactics, elapsed time between first and second pop-up, and location of the second pop-up with respect to the initial pop-up. Data gained from this experiment, when coupled with data from Phase IIB, the air-to-ground experiment, will produce information required to develop helicopter employment tactics. Detection time determined from the analysis of the data will be used in subsequent experiments as a guide for constraining helicopter pop-up times to reduce AHT vulnerability. GRA

N77-13660# Aeronautical Systems Div., Wright-Patterson AFB, Ohio.

A SCORING SYSTEM FOR THE QUANTITATIVE EVALUATION OF PILOT PERFORMANCE DURING MICROWAVE LANDING SYSTEM (MLS) APPROACHES Interim Technical Report, Oct. 1974 - Jan. 1975

Christopher J. Hyatt and Oak H. DeBerg Aug. 1975 23 p refs

(AD-A025782; ASD-TR-75-17) Avail: NTIS HC A02/MF A01 CSCL 05/9

The Crew Station Design Facility's scoring system for ILS approaches and landings has been extended for use with Microwave Landing System (MLS) approaches. The philosophy of scoring systems is briefly discussed, and the rationale for this application is developed. GRA

N77-13661# Army Aeromedical Research Lab., Fort Rucker, Ala.

DYNAMIC VISUAL ACUITY IN FATIGUED PILOTS Final Report

Isaac Behar, K. A. Kimball, and D. A. Anderson Jun. 1976 15 p refs

(DA Proj. 3A0-62110-A-819)

(AD-A027663; USAARL-76-24) Avail: NTIS HC A02/MF A01 CSCL 17/8

Six rotary wing aviators were subjects in a continuous operation regimen involving some 12 hours of flying and 3.5 hours sleep daily for five days. Estimates of performance on a dynamic visual acuity (DVA) task were obtained several times each day during the study using target velocities of 25 deg. and 40 deg./sec. DVA performance varied significantly during the fatigue regimen when measurements were made with target velocities of 40 deg./sec; with lower velocity targets differences in DVA scores were not significant. This indicates the need to tax the oculomotor system to demonstrate fatigue effects. Fatigue effects were partially obscured by practice effects which are considerable in the DVA task. DVA scores correlated only modestly with subjective estimates of fatigue intensity and flying performance, and IP ratings of performance, but the cluster of correlations provided a consistent picture. Author (GRA)

N77-13971 European Space Agency, Paris (France).

DISCRETE TIME MODELLING OF HUMAN PILOT BEHAVIOUR

Dominique Soulatges, Daniel Cavalli et al *In its* La Rech. Aerospatiale, Bi-monthly Bull. No. 1976-2 (ESA-TT-352) Nov. 1976 p 1-25 refs Transl. into ENGLISH from La Rech. Aerospatiale, Bull. Bimestriel (Paris), no. 1976-2, Mar.-Apr. 1976 P 63-73 Presented at the 11th Ann. Conf. on manual Control, Moffett Field, Calif., 21-23 May 1975

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